OLO Report 2024-12 July 30, 2024

A Comparison of Natural Grass and Synthetic Turf Athletic Fields in Montgomery County

Kaitlyn Simmons Kristen Latham

Office of Legislative Oversight

A Comparison of Natural Grass and Synthetic Turf Fields in Montgomery County

OLO Report 2024-12 **Executive Summary** **July 30th, 2024**

This Office of Legislative Oversight (OLO) report responds to Council's request to better understand the benefits and drawbacks of natural grass and synthetic turf fields in Montgomery County. This report includes research on environmental and health impacts of each field, legislation and social equity regarding synthetic turf, best practices in installation and maintenance, an inventory of the County's athletic fields, and County data on the use and cost of County rectangular athletic fields.

Environmental Impacts. OLO found significant gaps in available research assessing the risk of synthetic turf field materials. OLO found that (1) there is a lack of comprehensive epidemiologic research focusing specifically on potential health effects of synthetic turf on field users and communities and (2) there is a lack of research focused on various types of infill – most research focus on crumb rubber infill only.

Environmental Concerns of Synthetic Turf

- Contribution to waste
- Microplastic and PFAs pollution and runoff
- Loss of greenspace
- Implications for climate resilience
- Contribution to urban heat island effect

Environmental Concerns of Natural Grass

- Carbon emissions from maintenance
- Pesticide and nutrient runoff
- Water usage from irrigation

Both synthetic and natural grass athletic fields can impact the environment negatively. However, strategies exist to mitigate harmful environmental impacts of athletic fields such as using organic infill for synthetic turf fields, siting athletic fields away from waterways, and developing an organic management plan for grass fields.

Health Impacts. OLO found limited and inconclusive research on the health effects of synthetic turf compared to natural grass including a significant number of recent health safety studies that relied on older data. Other limitations include (1) the type of playing field is not solely responsible for injuries according to many studies; (2) a significant number of studies examined older generation synthetic turf fields with crumb rubber infill; and (3) most studies focus on athletes at a high level of competition (I.e., pro and college athletes).

A 2022 systematic review published in the American Journal of Sports Medicine that reviewed 53 studies conducted from 1972 – 2020 found that of the 32 articles that compared overall injury rates on newer generation synthetic turf and natural grass, over half **(53%)** reported no difference in overall injury rates between the playing surfaces, **38%** reported a higher overall injury rate on synthetic turf, and **9%** reported a higher overall injury rate on natural grass.

Legislation. Communities across the nation have been debating the installation and use of synthetic turf. This includes the banning, restriction, or moratoriums on the use of synthetic turf in Millbrae (CA), Westport (CT), Wayland (MA), Oaks Bluff (MA), Littleton (MA) and Concord, (MA). Other legislation passed has banned the use of certain materials in synthetic turf, such as tire crumb rubber infill (D.C.) and synthetic turf containing PFAS (NY, MD, and VT). Maryland also recently passed a bill that requires the Department of the Environment to establish a system to track the chain of custody of synthetic turf installed on athletic fields in the State, which is intended to increase transparency around the artificial turf waste.

Social Equity. OLO was not able to identify academic sources discussing equity issues surrounding the use of synthetic turf versus natural grass athletic fields; however, OLO identified discussions that occurred in some local communities regarding equity. Some organizations and jurisdictions assert that use of synthetic turf fields will increase social equity while others believe it will decrease equity. For example, some view synthetic turf fields as a tool to enhance health equity by providing more opportunities for recreation, especially within low-income, high-density neighborhoods while others are concerned it would decrease the amount of green space in low-income, high-density areas and would also increase both flooding and the heat island effect.

Best Practices in Installation and Maintenance. The construction and level of maintenance of synthetic turf and natural grass athletic fields directly affects the safety, playability, and available hours of use of the field. Both synthetic and natural grass athletic fields require regular maintenance to ensure optimal playability.

*Synthetic Turf. C*onsiderations in building a synthetic turf field include site grading, placement of foundational and structural layers with sufficient drainage infrastructure, and choices on infill material, synthetic turf carpet, and levels of mats and padding. Maintenance of synthetic turf fields requires:

- Removing surface debris;
- Surface cleaning with solvents and cleansers;[1]
- Grooming to keep plastic grass blades upright;
- Adding infill to maintain a level field;
- Repairing rips; and
- GMAX testing, which measures the shock absorption and shock impact for fields and user.

Natural Grass. Construction for natural grass fields includes consideration of base grading to ensure a level base, adequate water runoff, subsurface drainage, irrigation, grass and material selection and grass establishment. Significant use and traffic on natural grass fields causes soil compaction and can lead to an inconsistent surface with divots and bare patches, which can contribute to injuries. Natural grass fields need time to recover following use. Optimal maintenance of natural grass fields includes:

- Mowing;
- Nutrient management;
- Irrigation;
- Cultivation and surface management;
- Disease and pest control; and
- Limiting hours of use, especially after periods of rainy weather.

[1] According to synthetic turf suppliers, an antimicrobial cleaning product should be used to remove contaminants and bacteria growth. From: American Athletic Track and Turf

County Data on the Use and Cost of County Athletic Fields

Inventory of the County's Athletic Fields. OLO gathered data on the inventory of fields across MCPS, Parks, and Recreation and found the County has 784 athletic fields that can be permitted by the public – which includes 19 synthetic turf fields. MCPS has 14 synthetic turf fields, Parks has four, and Recreation has one (which is not permitted by the public).

Hours of Use. OLO received data on the hours of use from Parks, MCPS, and Recreation for their athletic fields. These hours correspond to **rectangular fields only**. This data does not include walk-on play/cell phone league play or play on MCPS fields for physical education class and athletic team practices/games.

Montgomery County Athletics Fields, FY23 Hours of Permitted Use, by Rectangular Field Type

	MCPS and Recreation Fields			Parks Fields		
	Synthetic	**Grass**	**All**	**Synthetic**	**Grass**	**All**
# Fields Rented	14	102	116	4	151	155
# Hours Rented	21,341	49,589	70,930	7,559	63,680	70,240
Average Hours per Field	**1,524**	**486**	**611**	**1,890**	**415**	**453**

Installation and Maintenance Costs. Both Parks and MCPS, along with Soccerplex, provided OLO with estimates on the cost of installation and maintenance of multiple types of fields. These costs, especially the maintenance costs for Parks, are estimates and meant to be looked at as a general magnitude of labor associated with each type of field, rather than actual labor hours and costs of maintenance. The data and caveats are discussed in further detail starting on page 83.

	Low-End Grass Field	**High-End Grass Field**	**Synthetic Turf Field**
Parks			
Installation Costs	$275-375K	$700-800K	$1.1m to $1.2m installation and $600k-$700k for carpet replacement
Annual Maintenance Costs	$21,635 Local Park $26,629 Regional Park	$26,800 Local Park $37,787 Regional Park	$33,229
MCPS			
Installation Costs	Unavailable	Estimated $1 million	$1.2m installation and $700k for carpet replacement
Annual Maintenance Costs	$35-40K	$50-55K	$12,000
Soccerplex			
Installation Costs	$250K-$750K (varies by type)		$1.4 million
Annual Maintenance Costs	$55,000 (varies by field type, grass type, use)		$12,000
Hours of Use	850 hours (cool season grass) 1,200 hours (Bermuda grass)		3,000 Hours

Stakeholder Feedback. OLO received a large amount of feedback, often conflicting, from stakeholders from all sides of the debate. The most repeated themes OLO heard from stakeholders include:

- **There are not enough athletic fields in the County to meet demand.**
- **In a perfect world, everyone would love to play on a safe and well-maintained natural grass field.** However, maintaining grass fields at a level desired by stakeholders is almost impossible with given resources and the need to limit hours of use to help maintain natural grass fields.
- **Almost all stakeholders agreed that both natural grass and synthetic turf surfaces are unsafe if they are not properly maintained.**
- **Stakeholders did not agree on the environmental and health risks associated with synthetic turf.** While data is inconclusive, for many, the "absence of data does not mean absence of harm." For others, the physical and mental health benefits of having people outside on fields outweighed any potential risks.

Discussion Items

The purpose of this report is to help the County Council and other County agencies and departments make informed choices on the surface type for athletic fields - natural grass and synthetic turf. This report is not intended to recommend one type of field over the other but to provide the known evidence and facts relating to each surface type and to summarize community feedback from a multitude of stakeholders. The following discussion items are intended to help guide the debate.

Discussion Issue #1. The Council should discuss with relevant stakeholders (MCPS, Parks, Recreation, community organizations) priorities regarding the use of athletic fields in the County. The decision to install, renovate, or utilize either natural grass or synthetic turf fields (or a combination of both) should be based on those priorities.

The choice between synthetic turf and natural grass for athletic fields impacts athletes, parents, facility managers and the community. Both options have their own set of advantages and disadvantages. County decisionmakers should consider the following when determining which surface to use:

- **Hours of Use**
- **Year-Round Play**
- **Increasing Access**
- **Health Impacts**
- **Environmental Impacts**
- **Playability**
- **Maintenance Levels**
- **Cost**
- **Equity**

Discussion Item #2. The Council should discuss with stakeholders opportunities to mitigate environmental and health impacts associated with both types of fields.

The use of both synthetic and natural grass athletic fields come with potential environment impacts - the materials used in synthetic turf fields and its contribution to waste have environmental consequences while the maintenance required for natural grass athletic fields is generally more carbon intensive than maintenance of synthetic turf. The Council should have conversations with stakeholders who build and maintain the County's athletic fields to understand what steps are routinely taken to mitigate environmental risks and to determine whether additional opportunities exist to further reduce environmental impacts.

OLO Report 2024-12

A Comparison of Natural Grass and Synthetic Turf Athletic Fields in Montgomery County

Table of Contents

INTRODUCTION

Montgomery County has a combination of both natural grass athletic fields and synthetic turf fields – with Montgomery County Public Schools (MCPS), Montgomery Parks (Parks), and the Montgomery County Department of Recreation (REC) all having at least one synthetic turf field in their inventory.

In September 2011, a staff work group with representatives from MCPS, Montgomery Parks, Department of Environmental Protection (DEP), Department of Health and Human Services (DHHS), and the County Council issued a report entitled "A Review of Benefits and Issues Associated with Natural Grass and Artificial Turf Rectangular Stadium Fields" that provided information on the benefits and drawbacks of synthetic turf and natural grass fields.[2]

The Council asked OLO to update the 2011 task force report, including summarizing any updates in the research available for the use of synthetic turf and natural grass fields. This report responds to that request and includes discussions of:

- Commonly identified environmental and health impacts of both types of fields;
- The costs and maintenance required for both types of fields;
- The playability/hours of use available on fields; and
- An overview of the inventory of fields in the County.

This report focuses on rectangular athletic fields (typically fields for soccer, football, lacrosse, etc.) – it does not review fields for baseball/softball diamonds. The report is organized as follows:

- **Chapter 1** provides an overview of both natural grass and synthetic turf athletic fields, including advantages and disadvantages of each;
- **Chapter 2** summarizes the environmental impacts of each type of field;
- **Chapter 3** outlines available research on the injuries and health data resulting from play on both types of fields;
- **Chapter 4** discusses legislation and equity issues regarding synthetic turf fields;
- **Chapter 5** summarizes best practices in maintenance of both type of fields, including case studies;
- **Chapter 6** provides an inventory of County rectangular athletic fields including number/type, along with maintenance and permitting policies;
- **Chapter 7** summarizes any available County data on the use and cost of County rectangular athletic fields;
- **Chapter 8** provides stakeholder feedback;
- **Chapter 9** summarizes OLO's findings and report discussion issues; and
- **Chapter 10** includes agency feedback from County Government, MCPS, and Parks.

[2] Montgomery County Government, "A Review of Benefits and Issues Associated with Natural Grass and Artificial Turf Rectangular Stadium Fields", 9/14/2011.

OLO Legislative Analyst Kaitlyn Simmons and Senior Analyst Kristen Latham completed this report with assistance from Leslie Rubin and Karen Pecoraro.

Acknowledgements. OLO appreciates the effort, assistance, and feedback provided for this report. The following individuals met with and/or provided information to OLO.

County Government and Montgomery Parks Staff

Office of the County Executive

Fariba Kassiri, DCAO
Monisola Brobbey
William Broglie
Debbie Spielberg

Council Central Staff

Keith Levchenko
Essie McGuire

Community Use of Public Facilities

Ramona Bell-Pearson, Director
Evelin Chavez
Paul Hibbard
Ron Maxson
Nancy Petzold-Earp

Department of Environmental Protection

Darian Copiz
Frank Dawson
Steve Martin
Krystal Reifer

Health and Human Services

Dr. James Bridgers, Director
Stella Sharif-Chikiar
Dr. Kisha Davis
Dr. Christopher Rogers

Montgomery County Revenue Authority

Jon Lobenstine

Montgomery Parks

Miti Figueredo, Director
Haviz Adeojo
Jeff Brightwell
Christie Ciabotti
Henry Coppola
Laura Dechter
Martin Eader
Galen Evans
Darren Flusche
Todd Holmes
Melanie Huggins
Sandra Samuel
Trish Swann
Carl Weber

Recreation

Robin Riley, Director
Michelle Bean
David Branick
Amanda DeFilippo
Jason Fasteau
Trish Gill

Montgomery County Public Schools

Seth Adams, Associate Superintendent
Dr. Jeffrey Sullivan, Director (Department of Athletics)
Lynne Harris, MCPS School Board
Greg Kellner
Shiho Shibasaki

MCPS High School Athletic Directors (Alphabetical by School)

Mike Krawczel, Bethesda-Chevy Chase
Rita Boule, Montgomery Blair
Jared Fribush, James Hubert Blake
Ed Dalton, Clarksburg
Cliff Elgin, Damascus
Joey Collins, Gaithersburg
Larry Hurd Jr., Walter Johnson
Amanda Twele, John F. Kennedy
Scott Zanni, Col. Zadok A. Magruder
Daniel Whitlow II, Richard Montgomery
Jody Tyler, Northwest
Marco Fuggitti, Northwood
Dessalyn Dillard, Paint Branch
Gina Grubb, Poolesville
Jeff Rabberman, Quince Orchard
Mike Hayes, Rockville
Jesse Irvin, Seneca Valley
Jason Woodward, Sherwood
Dan Feher, Springbrook
Lisa Magness, Watkins Mill
Tom McTighe, Wheaton
Bill Toth, Walt Whitman
Al Lightsey, Thomas S. Wootton

MCPS Student Climate Action Council

Raj Awasthi
Cindy Bagheri
Nikhita Bhatt
Quinley Borden
Peter Boyko
Celestia Krubally
Maggie McNulty
Mia Minus
Faith Nah
Antonio Persi
Angela Rivera
Walter Sha
Megan Stallard
Lumina Zhang

Local Stakeholders and Other Jurisdictions

Bethesda Lacrosse

Matt Breslin

Constituent

Jane Cunningham

Good Counsel High School

Bob Milloy (Football Coach)

Maryland Soccerplex

Matt Libber (Director)
Jerad Minnick

MoCo Lacrosse

Jeff Wagner

MSI

AJ Bownas
Wendy Calhoun

Northwest High School

Amy Soboslay (Parent)

Yolanda McKinney (Parent)

Safe Healthy Playing Fields

Diana Conway
Amanda Farber
Kathleen Michels

Fairfax County Government

Heather Lynch
Taylor Dixon
Sam Burris
Steven Krutzler
Karen Devor
Stacey Sommerfield
Kevin Rudd

Howard County Public Schools

Brandon Sands

Montgomery County Sports Advisory Committee

Tom Cove (Chair)
Samantha Griffin
Trish Heffelfinger
Joseph Hooks
Hannah Hutton
Tony Korson
Douglas Schuessler
Christopher Wajda

Turfgrass & Synthetic Turf Industry and Academic Experts

All Synthetic Turf

Jeremy Pimental
Jeff Trexler

Cornell University

Dr. Frank Rossi

Icahn School of Medicine at Mount Sinai

Dr. Sarah Evans

Laytonsville Landscaping

Dough Lechlider

Lowell Center for Sustainable Production

Dr. Rachel Massey

Synthetic Turf Council

Melanie Taylor, President
Isabela Velasco (Consultant)
Brendan Conley (Consultant)

University of Maryland

Dr. Geoff Rinehart

Glossary

Aerification. The mechanical process of reintroducing air and pore spaces on a natural grass field to relieve compaction and allow quicker movement of water, nutrients, and gases through the rootzone for better root development.

Compaction. The reduction of air space between the soil/rootzone particles of a natural grass field, or of the infill material of a synthetic field. A turf surface is considered compacted when heavy vehicular or foot traffic compresses the top two or three inches of soil on a grass field and reduces the movement of the infill material on synthetic fields. Compaction makes fields very firm.

Crumb Rubber. Coarse sand sized to small gravel sized rubber pellets used as an infill material in an artificial turf or top-dressed on a natural grass playing field.

Grooming. The dragging of a mat, broom, turf comb or spring-toothed rake on the surface to stand up the turfgrass, synthetic fibers or infield material after traffic has occurred.

Infill. Any product that is placed between the plastic fibers/blades of synthetic grass. Traditional synthetic turf infills include sand, rubber, EDPM, and TPE but also can range from cork, to coconut, to walnut shells, to ground up tennis shoe soles.

Native Soil. Unamended soil that is commonly found in a specified area.

Natural Grass/Grass/Turfgrass. A type of grass that is bred to be strong and durable and is often used in lawns, parks, athletic fields and golf courses. Some of the most popular grass species are bent, Bermuda, fine fescue, Kentucky bluegrass, ryegrass and tall fescue.

Resiliency. The ability of a surface to recover from, or adjust easily to, change from objects that strike the surface.

Synthetic Turf/Artificial Turf. Textile product designed to simulate the appearance and playability of natural grass utilizing a synthetic fiber grass blade constructed into fabric form.

Sources: Sports Field Management Association & The Motz Group

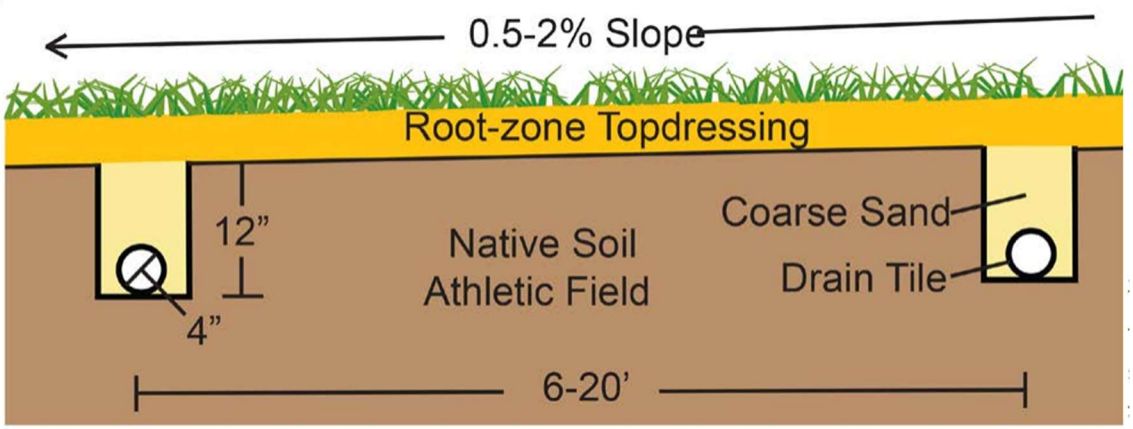
Chapter 1. Overview of Natural Grass and Synthetic Turf Athletic Fields

This chapter provides an overview of the general characteristics of natural grass and synthetic turf athletic fields, as well as an introductory overview of the commonly discussed advantages and disadvantages of each type of field. This report focuses on rectangular athletic fields (typically fields for soccer, football, lacrosse, etc.) – it does not review fields for baseball/softball diamonds or playgrounds.

Natural Grass

A natural grass athletic field is a playing surface comprised of living turf grasses. Natural grass athletic fields are constructed and maintained differently than a regular field or lawn to ensure optimal playability and safety. Best practices indicate athletic fields should be constructed with certain crown and slope[3] to ensure proper drainage while having an even surface for play.

The selection of grass species and the composition of the soil base can also affect drainage, which can impact the available hours of use for a field.[4] The diagram below illustrates the components of a native soil athletic field with sand caps[5] for enhanced drainage.



[3] The slope of a field is measured from the center of the field to the sidelines and is used to help move water to the sidelines for collection and drainage (Sports Turf Managers Association, "Drainage - A Crucial Component for Athletic Field Performance", Accessed 3/14/24.). The raised portion of a athletic field that provides a slope to promote runoff of surface water is called the field crown (Cornell College of Agriculture and Life Sciences, "Sports Field Management", Accessed 3/14/24.).

[4] Sports Field Management Association, "Natural Grass Athletic Fields", Accessed 3/14/24.

[5] Sand cap method is created when a small layer of topsoil (2-5”) is removed from the field and replaced with a 5-6” layer of specifically blended high sand-based rootzone material. Michigan State University, "Sand Cap Build-Up Systems for Michigan High School Fields", Accessed 3/14/24.

The types of natural turf grasses used for an athletic field are divided into two season categories: warm and cool season grasses:[6]

- For warmer climates, Bermuda grass is typically the preferred warm season grass for athletic field surfaces. Its growing season is during the summer from June to September and is dormant from October through Mid-May.[7]
- For cool climates, Kentucky bluegrass and perennial ryegrass are common to use on athletic fields. Kentucky bluegrass is especially popular as it has a rapid germination and establishment rate and is also good for ball rolling and bouncing, which is desired in some sports like field hockey.[8]

Montgomery County is in the Mid-Atlantic region, which is considered a transition area and does not quite match the profile for warm or cool climates. Multiple grass varieties are recommended for use in this region, such as some Kentucky bluegrass varieties, zoysia grass, and tall fescue grasses.[9]

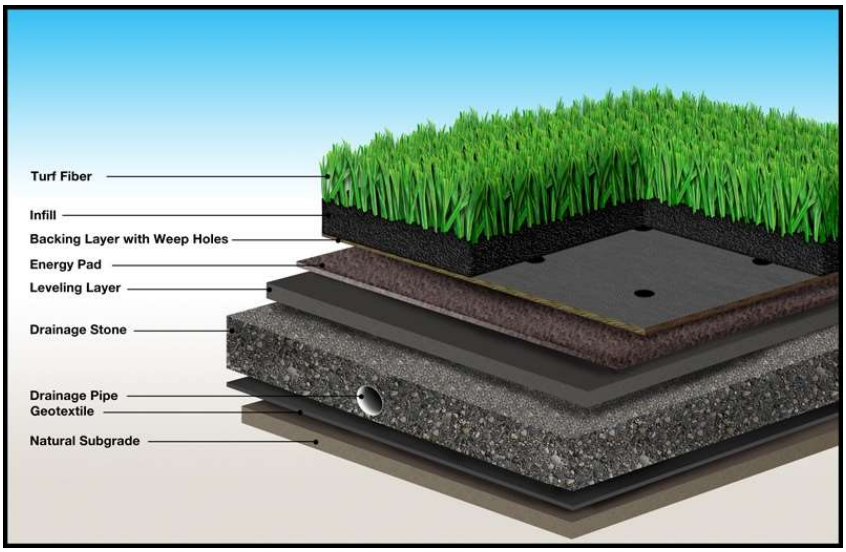
Synthetic Turf[10]

A synthetic turf athletic field, also known as an artificial turf field, is made of synthetic fibers that mimic natural grass. Specifically, synthetic turf is composed of three primary layers (as shown in the diagram below):

- Synthetic grass fibers which are typically made out of polyethylene, nylon, or a mixture of both and connected to a backing material;
- Filler granules, known as infill material, which can be made out of organic materials like cork or synthetic materials like rubber; and
- A support mat that allows for drainage, which is typically made out of foam, rubber, polyethylene, or polypropylene.

Synthetic turf fields usually also have a drainage system installed and energy pads for shock absorption.

[6] Sports Field Management Association, "Best Management Practices for the Sports Field Manager: A Professional Guide for Environmental Sports Field Management", April 2021.
[7] Ibid.
[8] Ibid.
[9] University of Maryland, "Recommended Turfgrass Cultivars for Certified Sod Production and Seed Mixtures in Maryland", July 2023.
[10] The terms "synthetic turf" and "artificial turf" are often used interchangeably. For this report, OLO will use the phrase "synthetic turf" unless the term "artificial turf" is used in a specific source.



History of Synthetic Turf.[11] The first synthetic turf field was installed in 1966 in the Houston Astrodome – it consisted of a thin nylon fiber woven carpet installed over top a compacted soil base.[12] This 1st generation turf was commonly associated with skin abrasions and ankle sprains (due to the high friction level of the woven carpet) along with other injuries (due to solidity of the base material, which was non-forgiving). Because of this, 2nd generation turf created in the mid-1970s included the addition of a shock-absorbing rubber pad over the compacted soil and replaced the original carpet with vertically positioned polypropylene fibers supported in a silica-sand infill.[13]

The 2nd generation turf also resulted in a high level of abrasions to players, which led to the creation of 3rd generation turf. Changes in 3rd generation turf included altering the fiber composition from polypropylene to polyethylene to decrease skin abrasions, increasing fiber length, and spreading the fibers laterally to decrease surface hardness. Further, the infill material was made deeper and switched from silica sand to crumb rubber or a mixture of both. Some infills used organic materials such as coconut fibers, cork, and ground walnut shells. Both changes were made to increase the shock absorbing properties of fields. While the industry has made improvements since 3rd generation turf was introduced, there have not been significant innovations on the design principles introduced in 3rd generation turf.[14]

[11] Gosnell, G. et. al., "Playing Surface and Injury Risk: Artificial Turf Vs. Natural Grass", 8/20/22.
[12] Jastifer, J. R., et. al., "Synthetic Turf: History, Design, Maintenance, and Athlete Safety", 8/10/18.
[13] Gosnell, G. et. al., "Playing Surface and Injury Risk: Artificial Turf Vs. Natural Grass", 8/20/22.
[14] Ibid.

Developments in Synthetic Turf. Several synthetic turf distributors informed OLO of new developments in turf design. This emergent technology has not been out on the market for long but attempts to address concerns surrounding the industry:

- Pivot Turf is a non-fill turf that does not contain any performance infill. Instead, the turf has a 'thatch layer' consisting of a dense layer of texturized fibers at the bottom of the product that take over the technical characteristics of the surface. The manufacturer claims this turf has no PFAs and reduces microplastic pollution sourced from synthetic turf.[15]

- GeoCool™ is an infill alternative that provides surface temperature reduction through slow evaporative cooling. GeoCool is an inorganic "egg-shaped" calcium carbonite mineral from shallow sea beds. Manufacturers report it is 100% recyclable, neutralizes odors, dust-free, and non-toxic. They further report that after two hours of exposure to a heat source, GeoCool was measured to be 50° F cooler than typical turf.[16]

- AstroTurf RootZone 3D3 Blend HD Turf System incorporates a RootZone layer, which is a texturized fiber matrix that enhances the stability of the field and reduces infill migration. This can help minimize injuries associated with irregularities in the playing field. The layer is combined with a high-density fiber system for improved durability and performance.[17]

Comparison of Synthetic Turf and Natural Grass

This section outlines the primary differences between synthetic turf and natural grass, including an introductory overview of the advantages and disadvantages of each type of field commonly discussed in research literature and among stakeholders. Subsequent chapters in the report explain in detail the various issues described on the next page.

NOTE: There is extensive debate and disagreement over the use of natural grass versus synthetic turf for athletic fields. ***However, no decisive and comprehensive research or data exists to support or refute many of the attributed advantages and disadvantages outlined below****. OLO also acknowledges that these advantages and disadvantages are a generalization and each type of field, both natural and synthetic, is unique.*

[15] Tencate, Pivot by Tencate, Accessed 6/11/2024.
[16] Geo Surfaces, GeoCool Cooling Agent, Accessed 6/11/2024.
[17] Astroturf, "Harnessing the Power of Innovation: The AstroTurf RootZone 3D3 Blend HD Turf System", Accessed 6/11/2024.

Natural Grass Fields: Summary of Advantages and Disadvantages

Advantages	Disadvantages
Environmental Benefits. Natural grass contributes to carbon sequestration, reduces stormwater surface runoff, and helps maintain a healthier ecosystem by supplying oxygen, filtering stormwater, and absorbing heat.	**Environmental Drawback**. Natural grass athletic fields often require the use of pesticides to ensure playability.
Cooler Surface. Natural grass remains cooler than synthetic turf during hot weather, reducing the risk of heat-related injuries and making it more comfortable for athletes.	**Maintenance.** Keeping natural grass up to the highest playing standards requires more consistent upkeep compared to a synthetic turf field. Natural grass requires regular mowing, watering, fertilizing, and pest control, which requires labor and incurs costs. This is especially true in climates that are not conducive to growing and maintaining grass.
Cost-Efficiency for Installation and Renovation. The installation and renovation cost of natural grass is typically lower than that of synthetic turf.	**Weather Dependency**. Use of natural grass fields can be heavily influenced by weather conditions. Fields are typically closed for use due to rain or extreme weather, which can disrupt scheduled events. Fields often cannot be used for several days after a big rainfall because use can significantly damage wet fields.
Potential for Less Injuries. There are some studies that show that natural grass is a safer playing surface with fewer injuries to players compared to synthetic turf fields, however studies are inconclusive and limited.	**Playability Issues.** The overuse of a natural grass field can result in uneven and damaged playing surfaces, affecting the quality of gameplay and increasing the risk of injuries to players. Further, rainfall or moisture on natural grass fields can create a slick surface.
No Waste. Natural grass fields do not have an end of life and, therefore, do not create waste that must be recycled or disposed of.	**Water Dependency.** Natural grass athletic fields require constant watering.
	Limited Hours. Often, natural grass fields are not available for play during winter months because the field needs to "rest." In addition, hours of use must be limited throughout the rest of the year to maintain fields in playable condition.

Synthetic Turf Fields: Summary of Advantages and Disadvantages (Continued)

Advantages	Disadvantages
Less Maintenance. Synthetic turf fields typically require less maintenance than natural grass fields. Where natural grass requires regular mowing, watering, and fertilizing, synthetic turf requires less. Required labor and maintenance costs are typically lower for synthetic turf fields.	**Chemical Exposure**. Synthetic turf fields can contain chemicals that may be harmful to human health and the environment. Chemicals can leach from the synthetic components of synthetic turf fields. Research shows that some synthetic turf fields contain potentially toxic chemicals such as microplastics and forever chemicals.
Water Conservation. Cornell College of Agriculture and Life Sciences reports that natural grass should receive about 1"-2" of water per week during the growing season. Although water is used occasionally for cooling and cleaning synthetic turf, OLO was unable to identify the quantity of water used for these purposes.	**Waste**. Currently, recyclability of the components of synthetic turf fields at the end of their lifecycle is questionable both due to limited information provided by companies that supply and maintain synthetic turf fields and because the complex construction of synthetic turf makes it challenging and costly to recycle.
Urban Environments. Synthetic turf fields are useful in urban environments that often have less land available for recreational fields.	**Drainage.** Synthetic turf does not pull water out of soil and release it into the air nor filter pollution to protect water quality of nearby waterways like natural grass can.
Year-Round Usage. Synthetic turf fields are typically available for use year-round except when the ground is frozen.	**Heat Issues**. Synthetic turf can reach significantly greater temperatures than natural grass under the same weather conditions, which can increase the risk of heat-related illnesses for players and create uncomfortable play conditions.
Consistent Play. Synthetic turf creates flat fields available for year-round play and provide more predictable play for athletes such as predictable ball bounce and consistent player footing.	**Potentially More Injuries**. While overall inconclusive, data from several studies show that injuries are more prevalent for athletes on synthetic turf compared with natural grass. An increased risk of "turf burn" also increases players' susceptibility to antibiotic-resistant staph infections (i.e., MRSA).

Synthetic Turf Fields: Summary of Advantages and Disadvantages (Continued)

Advantages	Disadvantages
Durability/More Hours of Play. Synthetic turf can withstand heavy use and is less susceptible to wear and tear compared to natural grass. Fields are not susceptible to bald spots or other damage from overuse like natural grass fields, allowing for longer hours of play on synthetic turf field. However, significant use shortens the lifespan of a synthetic turf field.	**Initial Cost.** The initial cost of installing synthetic turf can be relatively high, with costs varying depending on the type and quality of turf chosen. The replacement cost of synthetic turf can also be high.
Play During Most Weather. Synthetic turf can be used in various weather conditions, including during and after rain. OLO notes that synthetic turf can be dangerous to play on when the heat index ranges from 91 -104+ °F, due to high surface temperatures.	**Limited Lifespan**. Synthetic turf has a lifespan of typically eight to ten years. Lifespan can be impacted by local climate, maintenance, and use.
Permanent Marking. Field lines and markings for multiple sports can be permanently inlaid on synthetic turf fields, eliminating the need for continual re-striping with paint required for natural grass fields.	**Movement of Infill.** Synthetic turf infill requires proper depth and weight or it can move throughout the seasons, causing bulges and wrinkles in the surface that can be a hazard to players. Organic infill, in particular, can move during heavy rains and can be laborious to replace.

Hybrid Grass Turf

Hybrid grass turf is an emerging technology that uses a mixture of natural and synthetic materials - combining natural lawn grass with reinforcing synthetic fibers. There are three common variants used when installing a hybrid turf:

- Reinforced rootzone includes synthetic fibers and various additives mixed into the turf base layer to reinforce the upper section of the rootzone.
- Carpet-type includes a plastic mat that is placed on the subgrade, filled with material for the turf-bearing layer and appropriate seed sprinkled in. The turf is grown on a synthetic mat which contains some synthetic fibers. The mat is then infilled with rootzone and planted with natural grass seed.
- Stitched fiber occurs when synthetic fibers are implanted in the natural grass and stitched into the rootzone. The fibers extend to a depth of approximately 16–18cm into the playing field and connect with the roots of the natural grass. This is done by using large sewing machines which install a line of fibers approximately every 20mm. It is recommended that seeding take place prior to stitching but it can also be done afterwards. This technology is well established and is considered by many to produce the best performing field type.

Source: Ekipgrass, "What is Hybrid Grass Turf?", Accessed 4/12/24.

The benefits of a hybrid turf system may include:

- Requiring less maintenance, primarily due to shorter blades of turf requiring less mowing;
- Requiring less water for irrigation compared with natural grass fields;
- More sustainability in areas where grass does not easily grow;
- Use of fewer chemicals compared to synthetic turf;
- Prevention of soil erosion; and
- Increased durability compared to natural grass fields, allowing more hours of play.

Hybrid turf fields, however, have high installation costs.

Sources: Reform Sports, "Hybrid Turf: Different Systems in Use", Accessed 4/12/24. and FIFA, "2.4 Turf and Pitch Design", Accessed 4/12/24.

Chapter 2. Research On Environmental Impacts of Athletic Fields

This chapter summarizes research on the potential environmental impacts of both synthetic turf fields and natural grass fields. OLO reviewed research published in scientific journals, risk assessments conducted by governmental or scientific entities, and studies conducted by or on behalf of federal, state, and local government agencies. OLO also spoke to several academic experts in the field to collect their feedback on research investigating environmental impacts of athletic fields.

Overall, OLO found significant gaps in the available research assessing the risk of synthetic turf field materials. First, there is a lack of comprehensive epidemiologic research that focuses specifically on potential health effects of synthetic turf on field users and communities,[18] and second, there is a lack of research focused on various types of infill – almost all studies on infill focus on crumb rubber infill only.[19]

This chapter includes the following sections:

- **A. Environmental Impact - Synthetic Turf** summarizes general environmental concerns, impacts on runoff/waterways, and chemicals of concern in synthetic turf fields.
- **B. Environmental Impact – Natural Grass** summarizes general environmental concerns, impact on waterways, and chemicals of concern in natural grass fields.
- **C. Strategies to Mitigate Environmental Impacts** discusses mitigation strategies to lessen the negative impacts of both types of fields.

A. Environmental Impact – Synthetic Turf

As described in Chapter 2, the design of synthetic turf fields has gone through several iterations, beginning with the original AstroTurf. Since the discontinuance of AstroTurf, crumb rubber, including tire crumb rubber, has been the predominant type of infill utilized and almost all research available on the environmental impacts of synthetic turf is focused on tire crumb rubber. While new types of infill have been developed, there is little research available investigating the environmental impacts posed by new infill such as zeolite, virgin rubber, and plant-based infill.[20]

[18] Gomes, F. O., et. al., "A Review of Potentially Harmful Chemicals in Crumb Rubber Used in Synthetic Football Pitches", 5/5/21.; Murphy M. & Warner, G. R., "Health Impacts of Artificial Turf: Toxicity Studies, Challenges, and Future Directions", 10/1/22.

[19] Murphy M. & Warner, G. R., "Health Impacts of Artificial Turf: Toxicity Studies, Challenges, and Future Directions", 10/1/22.; U.S. Environmental Protection Agency, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report: Part 1", July 2019.

[20] Green Building Alliance, "Artificial Turf Fields: Health and Environmental Concerns", 1/6/2022.

Use of tire crumb rubber infill for synthetic turf was intended to be a way to divert old tires from landfills because they posed an enormous environmental risk and waste problem – landfills were overflowing with them and caused uncontrolled tire fires, releasing harmful chemicals.[21] Research shows, however, that tire crumb rubber infill from synthetic turf is a significant source of environmental plastic pollution and synthetic turf fields that have reached the end of their usable life are difficult to recycle and oftentimes, are discarded back into landfills.[22] Additionally, crumb rubber infill sourced from old tires has been shown to release heavy metals into stormwater, which can runoff to local waterways and has the potential to harm aquatic plant and animal life.

This section investigates the environmental concerns of synthetic turf (primarily tire crumb rubber), including chemicals of concern present in synthetic turf and runoff issues associated with synthetic turf fields. Research has shown there are chemicals of concern present in tires and the crumb rubber infill made from them, including heavy metals and known carcinogens.[23] However, based on existing research regarding player exposure to chemicals from synthetic turf fields, research from multiple government sources have found there is not enough evidence to advise people against playing sports on synthetic turf.[24]

General Environmental Concerns

Urban Heat Island Effect. The urban heat island effect occurs when urbanized areas experience higher temperatures compared to outlying areas. Typically, buildings, roads, and other urban infrastructure absorb and re-emit the sun's heat at a higher level compared to natural landscapes. In areas where urban infrastructure is concentrated and greenspace is limited, urban "islands" can experience temperatures of 1-7 degrees Fahrenheit higher in the daytime compared to outlying areas.[25] While there is little research on the overall contribution synthetic turf has on the urban heat island effect, synthetic turf retains heat and gives off higher ambient temperatures compared to both concrete and natural grass

[21] Armada, D., "Global Evaluation of the Chemical Hazard of Recycled Tire Crumb Rubber Employed on Worldwide Synthetic Turf Football Pitches", 3/15/22.; Los Angeles Times, "California and the West: Tire Fire Spews Hazardous Smoke", 9/23/1999.

[22] Maryland Matters, "Fields of Waste: Artificial Turf Becomes Mounting Disposal Mess", 12/21/2019.; WUSA9, "Recent Episode at Maryland Indoor Soccer Facility Puts Focus on Artificial Turf Waste Legislation", 4/6/2022.; The Atlantic, "The Dangerous Pileup of Artificial Turf", 12/19/2019.

[23] Zuccaro, P., et. al., "Artificial turf and crumb rubber infill: An international policy review concerning the current state of regulations", 12/2022.

[24] U.S. Environmental Protection Agency, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report Part 2, 04/2024.; National Institute for Public Health and the Environment, "Evaluation of health risks of playing sports on synthetic turf pitches with rubber granulate", 2017.; European Chemicals Agency, "An Evaluation of the Possible Health Risks of Recycled Rubber Granules Used as Infill in Synthetic Turf Sports Fields", 2/28/2017.; National Toxicology Program (U.S. DHHS), "The Chemical and Physical Characterization of Recycled Tire Crumb Rubber", July 2019.; Washington State Department of Health, "Synthetic Turf and Crumb Rubber", April 2017.; Pronk, M. E. J., et. al., "Synthetic Turf Pitches with Rubber Granulate Infill: Are There Health Risks for People Playing Sports on Such Pitches?", 5/30/2020.

[25] US EPA, "Heat Island Effect", Accessed 6/4/2024.

surfaces.[26] Synthetic turf fields, however, typically contribute less square footage of impervious surface[27] area compared to roads, parking lots, and other concrete surfaces that contribute much more (in terms of square footage) to the urban heat island effect.[28]

Implications for Climate Resilience. An impervious surface is defined as "any surface that prevents or significantly impedes the infiltration of water into the underlying soil" – the presence or lack thereof of impervious surfaces can have a significant impact on stormwater management as well as climate resiliency.[29] Impervious surfaces increase surface water runoff and can increase the delivery of pollutants into nearby waterways.[30] Synthetic turf is considered to be an impervious surface in Montgomery County, per Article 59, Section 1.4.2 of the General Zoning Ordinance Provisions.[31]

Because synthetic grass fields are impervious, they do not allow stormwater infiltration like natural grass fields and have been shown to have increased runoff and decreased water retention compared to natural grass.[32] This region is expected to see increasing summer temperatures and more heavy rainfall due to climate change, which can exacerbate heat, runoff and flooding issues associated with synthetic turf.[33] The analyses conducted for the County Climate Action Plan (CAP) found the County can expect to experience (1) moderate increases in more extreme precipitation events and in precipitation totals in the future due to climate change; and (2) an increase of extreme heat days[34] (12 additional days by 2035, on average, with temperatures above 95 degrees Fahrenheit, three times more than the County experienced in 2020 at the time of the CAP's publication).[35]

Water Use. While synthetic turf does not require mowing, fertilizers, or pesticides, maintaining synthetic turf still requires water use. For example, water can be used to cool off the synthetic surface prior to use during high temperature days.[36] Water is also used to sanitize and groom synthetic turf

---

[26] State of New Jersey DEP, "Synthetic Turf Impacts on Storm Water and Flood Resilience and Potential for Heat Island and Heat-Stress Effects", 6/23/2022.

[27] Impervious surfaces are defined as "any surface that prevents or significantly impedes the infiltration of water into the underlying soil" and this has stormwater management implications. Section B of this chapter discusses impervious surfaces in further detail

[28] Stakeholder feedback; State of New Jersey DEP, "Synthetic Turf Impacts on Storm Water and Flood Resilience and Potential for Heat Island and Heat-Stress Effects", 6/23/2022.

[29] Ibid.

[30] US EPA, "Urbanization - Stormwater Runoff", Accessed 5/24/2024.

[31] Montgomery County Code, Article 59-1. General Zoning Ordinance Provisions, Accessed 5/24/2024.

[32] Simpson, T. J. and Francis, R. A., "Artificial Lawns Exhibit Increased Runoff and Decreased Water Retention Compared to Living Lawns Following Controlled Rainfall Experiments," 08/2021.

[33] Toronto Public Health, "Health Impact Assessment of the Use of Synthetic Turf in Toronto", 04/2015.; Sydney, AU Office of the Commissioner for Sustainability and the Environment, "Synthetic Turf in a Warming Climate", 12/23/2023.; The New York Times, "As Climate Change Fears Grow, a Real Fight Over Fake Turf", 9/18/2021.; Montgomery County Government, "Montgomery County Climate Action Plan", June 2021.

[34] Extreme heat days in the CAP are defined as those days where the heat index and/or temperature reach 95 degrees Fahrenheit or above

[35] Montgomery County Government, "Montgomery County Climate Action Plan", June 2021.

[36] Artificial Grass Liquidators, "Why Does Artificial Sports Turf Need Water?", Accessed 4/24/2024.

fields, which is essential for upkeep and maintaining optimal playability.[37] However, OLO was unable to find an estimate of water used for cleaning and cooling a synthetic turf field.

Contribution to Waste. One of the largest environmental impacts that synthetic turf poses is its contribution to waste. Synthetic turf fields and materials must be disposed of or reused at the end of their useful life. Recycling synthetic turf fields has proven to be expensive and difficult as the materials are difficult to separate. Accordingly, many old synthetic turf fields end up in landfills. The number of fields that end up in landfills is uncertain because synthetic turf companies are not transparent in the end of life destination for old fields.[38] Overall, recycling technologies in the United States are not yet up to the task of recycling all the materials from synthetic turf, although there are some promising emerging technologies which are discussed in Section C of this chapter.

Loss of Green Space. Installing synthetic turf means the loss of green space and its benefits, such as the absorption of small amounts of carbon dioxide and the promotion of biodiversity as natural grass is home to many microbes, insects, and other organisms that live in the soil.[39]

Chemicals of Concern

Almost all chemicals of concern associated with synthetic turf are present in tire crumb rubber infill. Tire crumb rubber infill is the most studied component of synthetic turf regarding chemical makeup with both government agencies and academic researchers contributing to this body of research. However, there are no large-scale epidemiological studies that assess the risk of human health impacts from chemical exposure from synthetic turf use – outside of extremely limited studies focusing on cancer incidence.[40] Instead, studies have investigated the levels of chemicals present in synthetic turf and discuss potential environmental and health impacts from chemical exposure.[41]

Note that the mere presence of a chemical of concern does not directly equate with human exposure. A review of tire crumb rubber by the U.S. Environmental Protection Agency (EPA) in 2019 states "the amount of chemicals available for exposure through release into the air and simulated biological fluids is relatively low."[42] Further, research suggests that over time, the concentration of organic chemicals

[37] University of Maryland, "Answer: Why water the astroturf?", 4/19/2022.
[38] The Atlantic, "The Dangerous Pileup of Artificial Turf", 12/19/2019.; Maryland Matters, "Fields of Waste: Artificial Turf Becomes Mounting Disposal Mess", 12/21/2019.; WUSA9, "Recent Episode at Maryland Indoor Soccer Facility Puts Focus on Artificial Turf Waste Legislation", 4/6/2022.
[39] Toxics Use Reduction Institute (TURI), "Athletic Playing Fields: Choosing Safer Options for Health and the Environment", 12/2018.; University of Minnesota, "The Potential of Turfgrass to Sequester Carbon and Offset Greenhouse Gas Emissions", Accessed 4/13/2024.
[40] Murphy M. and Warner, G. R., "Health impacts of artificial turf: Toxicity studies, challenges, and future directions", 10/1/2022.; Washington State Department of Health, "Investigation of Reported Cancer among Soccer Players in Washington State", April 2017.
[41] U.S. EPA, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report Part 2, 04/2024.
[42] U.S. EPA, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report: Part 1", July 2019.

found in tire crumb rubber infill decreases as the field ages and is exposed to sunlight, which further lowers the risk of human exposure. A 2024 update to the EPA report tested samples of synthetic turf for chemical levels and concluded "that although chemicals are present in the tire crumb rubber and exposures can occur, they are likely limited."[43] There is limited research on the levels of chemicals present in plant-based, organic infill.[44]

The County has two public fields (both under Parks purview) left with crumb rubber infill, both of which are slated to be replaced with plant-based infill in the near future. Due to a 2015 resolution passed by the Montgomery County Council, most public fields in the County have organic, plant-based infill and no future fields paid with public funds will be installed with crumb rubber infill.[45]

The remainder of this section discusses chemicals of concern in synthetic turf and presents the available literature.

Polycyclic Aromatic Hydrocarbons (PAHs). PAHs are a chemical family of concern in synthetic turf.[46] PAHs "are a class of chemicals that occur naturally in coal, crude oil, and gasoline. They also are produced when coal, oil, gas, wood, garbage, and tobacco are burned. PAHs generated from these sources can bind to or form small particles in the air."[47] Humans can be exposed to PAHs through inhalation, ingestion or direct skin contact. Exposure can cause short-term health effects such as eye-irritation, nausea, vomiting, diarrhea, and chronic exposure can result in decreased immune functions, kidney and liver damage and breathing problems.[48] PAHs are also a known carcinogen.[49] PAHs have been found in synthetic fields with tire crumb rubber; there is limited research investigating its presence in turf fields with organic infill. The following studies discuss PAHs levels in synthetic turf fields with tire crumb rubber:

- Researchers from multiple universities in Spain, Portugal, and the Department of Environment and Health in Amsterdam, the Netherlands, conducted a global evaluation of 91 synthetic turf fields from 17 different countries and found most samples exceeded the limit set for eight types

[43] U.S. EPA, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report Part 2, 04/2024.
[44] Massey, R., et. al., "Artificial Turf Infill: A Comparative Assessment of Chemical Contents", 2/23/2020.
[45] Montgomery County Council, "Resolution 18-58 - Use of Plant-Derived Materials for Infill in Artificial Turf Playing Fields", Adopted 2/10/2015.
[46] PAHs are a subgroup of semi-volatile organic compounds (SVOCs) which are a subgroup of volatile organic compounds (VOCs). PAHs and VOCs are discussed separately in this report due to this.
[47] Sibeko, M. A., et. al., "Trends in the Management of Waste Tyres and Recent Experimental Approaches in the Analysis of PAHs from rubber crumbs", 11/9/2020.
[48] Ibid.
[49] Murphy M. and Warner G. R., "Health Impacts of Artificial Turf: Toxicity Studies, Challenges, and Future Directions", 8/7/2022.

of PAHs for consumer goods and in materials that have "intensive contact with the human skin or the oral cavity";[50] and

- A 2024 EPA study found low levels of PAHs were present in synthetic turf samples tested. However, ingestion of tire crumb rubber appears to be the most significant pathway of exposure for specific PAHs chemicals present and exposure decreases with age due to an assumed decrease in tire crumb rubber.[51]

Overall, the studies are inconclusive on the risks posed by PAHs exposure during play on synthetic turf with tire crumb rubber infill and suggests that further research is needed.[52]

Polyfluoroalkyl Substances (PFAS). PFAS are a group of man-made compounds of chemicals widely used in consumer and industrial products (e.g., cosmetics, fast food packaging, stain resistant products, pesticides) and are long lasting in the environment and are commonly referred to as "forever chemicals."[53] [54] The PFAS family includes dozens of chemicals and the more well known and studied are perfluorooctane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and perfluorohexanesulfonic acid (PFHxS). PFAS do not break down in the environment, can contaminate drinking water sources, and accumulate in the bodies of fish and wildlife. PFAS are found in blood samples of people and animals, as well as in food.[55]

Unfortunately, there are extensive gaps in research about the extent to which PFAS could pose a threat to long-term human and environmental health.[56] However, emerging research has shown there is evidence that long-term exposure to some PFAS may be linked to adverse health effects in humans, such as:

- Increases in cholesterol levels;
- Changes in liver enzymes;
- Pregnancy-induced hypertension and preeclampsia and small decreases in birth weight;

---

[50] Armada, D. et. al., "Global Evaluation of the Chemical Hazard of Recycled Tire Crumb Rubber Employed on Worldwide Synthetic Turf Football Pitches", 3/15/22.
[51] U.S. EPA, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report Part 2, 04/2024.
[52] Mohammed, A. M.F., Saleh I. A., and Abdel-Latif, N. M., "Hazard assessment study on organic compounds and heavy metals from using artificial turf", 3/29/2023.; Armada, D. et. al., "Global Evaluation of the Chemical Hazard of Recycled Tire Crumb Rubber Employed on Worldwide Synthetic Turf Football Pitches", 3/15/22.
[53] U.S. EPA, "PFAS Explained", Accessed 3/14/2024.
[54] Minnesota Department of Health, "Perfluorooctance Sulfonic Acid (PFOS) and Water", January 2024.; Agency for Toxic Substances and Disease Registry, "ToxFAQs for Perfluoroalkyls", March 2020.; U.S. EPA, "IRIS Toxicological Review of Perfluorohexanesulfonic Acid (PFHxS)", 2023.; Agency for Toxic Substances and Disease Registry, "What are the health effects of PFAS?)", 2016.
[55] Mohammed, A. M.F., Saleh I. A., and Abdel-Latif, N. M., "Hazard assessment study on organic compounds and heavy metals from using artificial turf", 3/29/2023.
[56] U.S. Geological Survey, "USGS Releases Strategy for Addressing PFAS Science Gaps", 12/22/2021.; Maryland Department of the Environment, "Maryland and PFAS", December 2023.

- Lower antibody response to some vaccines; and
- Kidney and testicular cancer.[57]

Prior to April 2024, the Federal government did not regulate PFAS.[58] However, on April 10, 2024, the EPA announced the final National Primary Drinking Water Regulation, which sets legally enforceable limits for six PFAS present in drinking water.[59]

There is emerging research investigating the presence of PFAS in synthetic turf and what levels of contamination pose a concern to human and environmental health.[60] However, the production of synthetic turf materials is not uniform among manufacturers and there can be differing presence and levels of chemicals in individual fields.[61] In addition, synthetic turf manufacturers do not typically disclose the chemicals present in their products making it difficult to identify specific PFAS in the contents of the field.[62] The EPA also notes PFAS are linked more closely to other sources, such as food packaging, manufacturing facilities, household and personal care products, and drinking water.[63]

Research into the presence of PFAS in synthetic turf is limited.[64] However, one 2022 peer-reviewed study published in *Environmental Science and Technology Letters* found PFAS were present in synthetic turf, specifically in about 42% of all samples tested, including the backing, filling,[65] and the synthetic grass blades.[66] The study authors found that PFAS observed in the study appeared to be bound to the components of synthetic turf and were not at risk of leaching into the environment. The study concluded the presence of PFAS in the field studied does not pose an exposure concern for field users.[67]

Other Chemicals of Concern. The EPA's April 2024 report on tire crumb rubber infill in synthetic turf identified a large number of chemicals associated with tire crumb rubber infill that have not been included in most exposure assessments. The chemicals of concern highlighted in this section – volatile

---

[57] Agency for Toxic Substances and Disease Registry, "PFAS Information for Clinicians", Accessed 3/14/2024.; U.S. EPA, "PFAS National Primary Drinking Water Regulation", 4/9/2024.

[58] U.S. EPA, "Per- and Polyfluoroalkyl Substances (PFAS): Final PFAS National Primary Drinking Water Regulation", April 2024.

[59] Public water systems will have until 2029 to monitor and implement solutions to reduce the presence of PFAS if they exceed the maximum contaminant levels. By 2029, if public water systems exceed the MCLs, they must take action to reduce the levels and provide notification to the public.

[60] Washington Post, "Turf fields may have 'forever chemicals.' Should kids be playing on them?", 3/12/2024.

[61] Stakeholder Feedback

[62] Toxics Use Reduction Institute, "Per- and Poly-fluoroalkyl Substances (PFAS) in Artificial Turf Carpet", Accessed 3/19/2024.

[63] U.S. EPA, "Our Current Understanding of the Human Health and Environmental Risks of PFAS", Accessed 3/15/2024.

[64] Zuccaro, et. al., "Artificial turf and crumb rubber infill: An international policy review concerning the current state of regulations", 12/2022.

[65] Sampling including infill materials made of thermoplastic olefins (TPO), TPE, SBR, sand, EPDM, and an organic filling consisting of cork, bark, and coconut.

[66] Lauria M. Z., et. al., "Widespread Occurrence of Non-Extractable Fluorine in Synthetic Turfs from Stockholm, Sweden", 2022.; New Jersey Department of Environmental Protection, "PFAS in Artificial Turf", 2/8/2023.

[67] Lauria M. Z., et. al., "Widespread Occurrence of Non-Extractable Fluorine in Synthetic Turfs from Stockholm, Sweden", 2022.

organic compounds and lead – are the more well-studied chemicals. As stated before, there is limited research and data available on the human and health impacts specifically from exposure to synthetic turf and its material components[68] resulting in a lack of certainty about the overall exposure of field users from chemicals associated with tire crumb rubber.[69]

Volatile organic compounds (VOCS) are chemical compounds (typically human-made) that are emitted as gases from certain solids or liquids. Many consumer products emit VOCs, including rubber tires and inhalation of VOCs linked to short- and long term adverse health effects.[70] However, research has shown the risk of inhaling VOCs from tires is higher in prolonged indoor exposure compared to outdoors.[71] Although low concentrations are detected outdoors, including on outdoor synthetic turf fields with tire crumb rubber infill, concentrations of many VOCs are consistently higher indoors (up to ten times higher).[72] However, due to limited data, there is uncertainty in exposure estimates for field users.[73]

Lead and other heavy metals have been detected in synthetic turf with tire crumb rubber infill. The 2024 EPA report observed lead and zinc on fields with tire crumb rubber infill. The research compared background exposure to lead from residential and dietary sources to modeled exposure estimates for synthetic turf field users and found that exposure from residential and dietary sources are estimated to be over 100 times higher than the modeled exposure estimates for synthetic turf field users. Estimates using existing data from studies showed exposure to lead was over 10 times higher for residential and dietary sources compared to estimates for synthetic turf field users.[74]

[68] Stakeholder feedback, U.S. Environmental Protection Agency, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report Part 2, 04/2024.
[69] Ibid.
[70] U.S. EPA, "What are volatile organic compounds (VOCs)?", Accessed 3/17/2024.
[71] Wang, S., et. al., "Emission Characteristics and Health Risks of Volatile Organic Compounds (VOCs) Measured in a Typical Recycled Rubber Plant in China", 7/2022.
[72] U.S. Environmental Protection Agency, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report Part 2, 04/2024.
[73] Mohammed. A. M. F., et. al., "Hazard assessment study on organic compounds and heavy metals from using artificial turf", 3/29/2023.; U.S. Environmental Protection Agency, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report Part 2, 04/2024.
[74] U.S. Environmental Protection Agency, "Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report Part 2, 04/2024.

Impacts on Waterways

Research has shown that components of synthetic turf fields, including synthetic grass blades and infill materials (especially tire crumb rubber infill), pose an environmental risk to local waterways.[75] Crumb rubber infill sourced from old tires have been shown to release heavy metals into stormwater, which can runoff to local waterways and have the potential to harm aquatic plant and animal life.[76]

Research has also shown that runoff from synthetic turf fields, especially those with tire crumb rubber infill, pose a serious risk of microplastic pollution in waterways.[77] A 2023 study investigating runoff in riverways found synthetic turf fibers accounted for about 15% of the plastic pollution content in the river studied and suggested synthetic turf fibers may contribute significantly to plastic pollution, especially if sited near a local waterway.[78]

While most studies have focused on tire crumb rubber, plastic grass blades from synthetic turf fields can degrade and break off over time and contribute to microplastic pollution (to a lesser extent compared to rubber infill).[79] Use of new plant-based infill materials in synthetic turf fields, while reducing microplastic pollution from crumb rubber infill, does not eliminate the potential of microplastic pollution from synthetic turf fields.[80]

Due to concern about microplastic pollution in waterways, the European Union (EU) banned tire crumb rubber infill in 2023, shifting to alternative infill such as cork and other plant-based products.[81] According to the European Chemicals Agency (ECHA), the largest single source of microplastic pollution in EU member states is rubber infill material used on synthetic turf fields and is responsible for about 38% of the estimated total annual amount of microplastics released into the EU's environment.[82]

---

[75] Murphy, M. and Warner, G. R., "Health Impacts of Artificial Turf: Toxicity Studies, Challenges, and Future Directions", 10/1/2022.; Tian, Z., et. al., "6PPD-Quinone: Revised Toxicity Assessment and Quantification with a Commercial Standard", 1/11/2022.

[76] Fort, J., et. al., "Environmental Consequences of Rubber Crumb Application: Soil and Water Pollution", 3/30/2022.

[77] Zeilerbauer, L., et. al., "Quantifying the Sustainability of Football (Soccer) Pitches: A Comparison of Artificial and Natural Turf Pitches with a Focus on Microplastics and Their Environmental Impacts", 04/22/2024.; de Haan, W. P., et. al., "The dark side of artificial greening: Plastic turfs as widespread pollutants of aquatic environments", 10/1/2023.

[78] de Haan, W. P., et. al., "The dark side of artificial greening: Plastic turfs as widespread pollutants of aquatic environments", 10/1/2023.

[79] Simpson T. J. & Francis, R. A., "Artificial Lawns Exhibit Increased Runoff and Decreased Water Retention Compared to Living Lawns Following Controlled Rainfall Experiments", 08/2021.

[80] de Haan, W. P., et. al., "The dark side of artificial greening: Plastic turfs as widespread pollutants of aquatic environments", 10/1/2023.

[81] Zuccaro, P., et. al., "The European Union Ban on Microplastics Includes Artificial Turf Crumb Rubber Infill: Other Nations Should Follow Suit", 2/1/2024.

[82] European Chemicals Agency, "Microplastics", Accessed 3/17/2024.

B. Environmental Impact – Natural Grass

This section provides an overview of environmental concerns of natural grass athletic fields. Overall, natural grass is a more environmentally friendly option for athletic fields compared to synthetic turf for a multitude of reasons. Natural grass:

- Has the ability to absorb carbon in the soil and generally has a smaller carbon footprint[83] compared to synthetic turf.[84]
- Allows better stormwater management and produced less runoff compared to synthetic turf (especially when built with proper drainage);
- Promotes biodiversity; and
- Provides a cooler surface for play.[85]

For stormwater management specifically, natural grass with good drainage:

- Filtrates stormwater and reduces the amount of sediment and pollution entering water bodies; and
- Redirects the flow of stormwater, slowing runoff and allowing more water to be absorbed into the soil, which aids in the prevention of soil erosion and flooding.[86]

For optimal playability, however, natural grass athletic fields require intensive maintenance, including mowing multiple times a week, irrigation, and application of pesticides and inorganic fertilizers. These practices decrease the overall positive environmental impact that natural grass athletic fields have.[87]

General Environmental Concerns

Maintaining a natural grass field for athletic use generally requires more carbon intensive maintenance compared to synthetic turf.[88] While natural grass fields, especially with drainage systems, have a lower carbon footprint compared to synthetic turf fields, significant carbon emissions are still associated with the installation and maintenance of natural grass fields.[89] A study commissioned by the City of Zurich, Switzerland found natural grass fields' biggest environmental impact comes from the operation and maintenance of the fields, due to use of fertilizers, pesticides, and diesel-powered vehicles for mowing, aerating, and adding soil and sand to a field.[90]

---

[83] A study conducted by the City of Zurich, Switzerland found that natural turf with a drainage layer is associated with the lowest greenhouse gas emissions per hour of use, due to a decrease in maintenance for grass fields with drainage. It also found that synthetic turf pitches without infill tie for the lowest greenhouse gas emissions per hour of use.
[84] Itten, R., et. al., "An ecological comparison of synthetic and natural turf", 1/28/2021.
[85] Claudio, Luz, "Synthetic Turf: Health Debate Takes Root", 3/11/2008.
[86] SFMA, "Natural Grass Athletic Fields", Accessed 3/21/24.; Stakeholder Feedback
[87] Lozano, J. E. and Ferguson, S., "Ecosystem Services for Compensation of Artificial Turf Systems", May 2021.
[88] Itten, R., et. al., "An ecological comparison of synthetic and natural turf", 1/28/2021.
[89] Department of Local Government, Sport and Cultural Industries - Western Australia, "Natural Grass vs Synthetic Turf Decision Making Guide", Accessed 3/21/24.
[90] Itten, R., et. al., "An ecological comparison of synthetic and natural turf", 1/28/2021.

Grass athletic fields require frequent mowing to ensure the surface is safe for play. For optimal playability, mowing is recommended two to three times per week.[91] Exhaust from gas powered mowers and lawn equipment releases emissions that contribute to the formation of ground-level ozone, which can lead to health problems such as respiratory and cardiovascular diseases. [92]

Unfortunately, data is scarce on the contribution of mowing to annual greenhouse gas emissions specifically for athletic fields in the United States. A study conducted by the EPA (using estimates from 2011) found that all nonroad sources (which includes tractors, snowblowers, leaf blowers, trimmers, and lawnmowers that use gasoline) accounts for 4% of all CO2 emissions annually.[93] OLO notes this estimate includes both private and public grasses, such as lawns, fields, and golf courses and the emission sources were not aggregated by type of nonroad sources nor by type of grass surface.

Lastly, while water is used for cleaning and sanitizing on synthetic turf, natural grass fields, (especially those with irrigation systems) use more water comparatively. Water use varies depending on the climate, location, and drainage infrastructure of fields but it is estimated that natural grass athletic fields can use up to 1.5 million gallons of water per acre annually for irrigation.[94] [95]

Chemicals of Concern

Chemicals are applied to natural grass athletic fields to improve soil health through addition of nutrients and to kill weeds and pests.[96] In particular, nitrogen applications are commonly used in the maintenance of athletic fields (including County athletic fields), to support sufficient grass growth to allow fields to recover from intense traffic from use and to ensure safe playing conditions.

Excess nitrogen can contribute to:

- The formation of ground-level ozone that negatively impacts air quality;
- Increases in amounts of greenhouse gases, acid rain, and the thinning of the Earth's protective ozone layer;
- Pollution of drinking water; and
- Oxygen depletion of bodies of water, harming aquatic wildlife.[97]

[91] Cornell College of Agriculture and Life Sciences, "Mowing | Sports field management", Accessed 3/21/24.
[92] New Hampshire Department of Environmental Services, "Take Steps to Limit Air Emissions When Using Garden Equipment", 2020.
[93] U.S EPA, "National Emissions from Lawn and Garden Equipment" 2015.
[94] Claudio, Luz, "Synthetic Turf: Health Debate Takes Root", 3/11/2008.
; Texas Cooperative Extension, "Water Management on Turfgrasses", Accessed 3/22/24.
[95] Full sized rectangular athletic fields are about 1.32 acres
[96] Gilden, R., et. al., "Potential Health Effects Related to Pesticide Use on Athletic Fields", 3/9/2012.
[97] U.S. EPA, "Understanding the Impacts of Synthetic Nitrogen on Air and Water Quality Using Integrated Models", 3/22/2021.

Elevated levels of nitrogen and phosphorus have been identified as major contributors to the decline to the health of the Chesapeake Bay and other nearby water ways.[98] Nitrogen can also indirectly cause human health impacts, such as respiratory and heart illnesses, through its contribution to ground-level ozone pollution.[99]

Ways to mitigate excess nitrogen include using certain types of nitrogen, timing of application, and planning fields not near waterways nor surrounded by significant impervious surfaces.[100] OLO notes the applications of nitrogen treatments are regulated by the State of Maryland to mitigate the risk of negative environmental impacts.[101]

Impacts on Waterways

While nutrients are essential for plant growth, too many nutrients in a body of water can have harmful environmental effects. Excessive levels of nutrients – especially nitrogen and phosphorus – leads to eutrophication in a body of water. Eutrophication is an overabundance of nutrients in a body of water that can lead to algal blooms, some of which release toxins into the water. When the algae die off, the process consumes oxygen in the water that is needed by fish and other aquatic life to live, potentially resulting in significant fish deaths.[102]

Nitrogen is used as a common treatment for athletic fields and is used on some County fields.[103] Human use of pesticides and fertilizers can accelerate eutrophication[104] when athletic fields are close enough to a body of water to lead to nutrient and chemical runoff.[105]

[98] Sources of excessive nitrogen and phosphorous come from fertilizers, wastewater, septic tank discharge, air pollution, and runoff from farms, cities and suburbs.
[99] U.S. EPA, "Understanding the Impacts of Synthetic Nitrogen on Air and Water Quality Using Integrated Models", 3/22/2021.
[100] University of Maryland, "Nutrient Management Guidelines for Athletic Fields in Maryland", June 2014.
[101] Maryland Department of Agriculture, "AgBrief: Pesticide Regulation", 02/2013.
[102] U.S. Geological Survey, "Nutrients and Eutrophication", 3/3/2019.
[103] Stakeholder Feedback
[104] Yang, X., et. al., "Mechanisms and assessment of water eutrophication", 3/9/2008.
[105] U.S. EPA, "Nutrient Pollution: Sources and Solutions: Agriculture", Accessed 3/25/24.

C. Strategies to Mitigate Environmental Impacts

Both synthetic turf and natural grass athletic fields can impact the environment negatively. This section describes strategies that can mitigate harmful environmental impacts for both types of fields.

Installing Drainage and Stormwater Management Infrastructure. Installing a drainage system is beneficial to both natural grass and synthetic turf fields. Drainage systems can alleviate runoff issues in addition to improving the playability of the field. Further, poor drainage can contribute to turf diseases for natural grass.[106]

Installing stormwater management infrastructure can also decrease runoff volumes and filter sediments to prevent them from reaching waterways. According to a map developed by the Department of Environmental Protection (DEP), the following stormwater management infrastructure is installed around some of the synthetic turf fields in the County:[107]

- *Bioswales (also referred to as vegetated grass swales)* are ditches with vegetation that collect, filter, and reduce the total volume of stormwater runoff. The vegetation in the ditches can collect and filter suspended sediments from the water passing through.[108] A few County synthetic turf fields, including the fields at Wheaton Sports Pavilion and Laytonia Recreational Park have multiple bioswales surrounding the fields.[109]
- *Oil/grit separators* are structures with multiple chambers designed to remove sediment and oils from stormwater before it reaches a storm drain network or groundwater.[110] County fields with this structure nearby include Blair Local Park at Blair High School's synthetic turf stadium field.[111]
- *Infiltration trenches* are typically gravel-filled trenches that control the speed at which stormwater soaks into the ground. Vegetation is sometimes installed in these trenches for filtration of pollutants, such as large particles.[112] Some County fields, including the stadium fields at Walter Johnson High School and Blair Local Park, have this structure nearby.[113]
- *Bioretention (sometimes referred to as rain gardens)* are depressions with landscaping (i.e., shrubs) that collect and treat stormwater discharge from impervious surfaces, including

[106] University of Maryland, "Nutrient Management Guidelines for Athletic Fields in Maryland", June 2014.
[107] Montgomery County Department of Environmental Protection, "Synthetic Turf Field Locations in Montgomery County", Accessed 3/26/24.
[108] SUNY ESF, "Bioswales", Accessed 3/25/24.
[109] Montgomery County Department of Environmental Protection, "Synthetic Turf Field Locations in Montgomery County", Accessed 3/26/24.
[110] Yale Environmental Health and Safety, "Stormwater Best Management Practices", 01/2011.
[111] Montgomery County Department of Environmental Protection, "Synthetic Turf Field Locations in Montgomery County", Accessed 3/26/24.
[112] U.S. EPA, "NPDES: Stormwater Best Management Practices, Infiltration Trench", Accessed 3/25/24.
[113] Montgomery County Department of Environmental Protection, "Synthetic Turf Field Locations in Montgomery County", Accessed 3/26/24.

synthetic turf.[114] Multiple County fields, including the synthetic turf fields at Julius West Middle School, have bioretention structures installed nearby.

- *Sand filters (sometimes referred to as filtration basins)* are stormwater quality treatment systems whose primary benefit is the removal of sediment. Sand filters can also reduce peak runoff rates.[115] One County field with multiple sand filters installed nearby is the Gaithersburg High School stadium field.

Other non-structural controls that can be employed to mitigate environmental impacts of fields include:

- Sustainable landscaping in the surrounding area of the field;
- Ornamental grasses, native plants, and trees can be planted to slow down and filter runoff from fields, while providing food and cover for wildlife and providing shade near the field for both athletes and spectators;[116] and
- With proper drainage, natural grass fields can also function as stormwater infrastructure - the grass and soil work to filter pollutants from stormwater and provide stormwater infiltration.[117]

Organic Infill. Using organic infill can mitigate negative environmental impacts associated with tire crumb rubber infill, including the chemicals associated with old tires and microplastic pollution. Cork is a popular choice for organic infill because it does not contribute to microplastic pollution and does not require the felling of trees to harvest. Instead, bark is removed from the trees and then turned into cork.[118] OLO notes research on any negative environmental impacts associated with plant-based organic infill is extremely limited.[119]

Recycling and Reuse. New technologies are emerging in recycling and reuse for synthetic turf. Re-Match, a company based in the EU, is able to separate components of synthetic turf (i.e., sand, backing, rubber, and plastic fibers) into clean, raw materials. The company began operations in 2016 and their process was validated by the EU Environmental Technology Verification program where third-party evaluators used International Standardization Organization (ISO) certified methods for validation.[120] Re-Match has attempted to move into American markets with a recycling facility in Pennsylvania.

---

[114] U.S. EPA, "NPDES: Stormwater Best Management Practice, Bioretention (Rain Gardens)", Accessed 3/25/24.
[115] SUNY ESF, "Sand Filters Basins", Accessed 3/25/24.
[116] Sports Field Management Association, "Best Management Practices for the Sports Field Manager: A Professional Guide for Environmental Sports Field Management"", April 2021.
[117] SFMA, "Natural Grass Athletic Fields", Accessed 3/25/24.; Stakeholder Feedback
[118] Russo, C., et. al., "The product environmental footprint approach to compare the environmental performances of artificial and natural turf", 07/2022.
[119] Massey, R., et. al., "Synthetic Turf Infill: A Comparative Assessment of Chemical Contents", 2020.
[120] Nordic Alpha Partners ApS, "Comparative Analysis of Major Companies within Artificial Turf Recycling and Treatment", 4/3/2020.

However, due to unspecified reasons, its scheduled 2019 opening has been delayed and it is not open as of June 2024.[121] [122]

More innovations in recycling and reuse are emerging to reduce the amount of waste from old synthetic turf fields to repurpose old fields, potentially increasing the affordability of recycling. Examples include:[123] [124]

- Processing an old synthetic turf field to turn it into a shockpad that can be used for a new field;
- Converting old synthetic turf materials into mixed polymer plastic; and
- Using parts of the synthetic fields for surfacing in batting cages, small athletic practice areas, and landscaping.[125]

Field User Education and Behaviors. Public education can help mitigate the amount of infill that is taken off the field, which can reduce the chance of exposure to chemicals in synthetic turf. Practices, such as washing hands after synthetic turf use, dumping any infill collected in shoes into proper receptacles, or putting up fences to reduce the amount of infill escaping into other surfaces can be put in place to help reduce negative impacts.[126]

Siting and Design Choices. The site of a field is crucial for mitigating any negative impacts. Factors such as drainage systems, locations of existing municipal sewer systems and stormwater infrastructure, existing soil composition and drainage patterns, all have implications on the potential runoff from both natural and synthetic grass fields.[127] However, OLO notes synthetic fields may be more appropriate to install in higher density areas that has less greenspace and high demand for spaces to recreate.[128]

For example, siting a field away from a special protection area or waterways can alleviate sediment pollution and runoff concerns. If a field is sited near a more vulnerable area, it may make sense to

---

[121] The Philadelphia Inquirer, "'Forever Fields': How Pennsylvania became a dumping ground for discarded synthetic turf", 12/13/2023.

[122] Due to these delays, Re-Match collected and stored synthetic turf materials for years on the site of the future recycling plant without proper permitting from Lebanon County, Pennsylvania. The turf materials were stored outside, which can allow leaching of materials into the environment. However, Re-Match maintained they held on to the materials so they would not end up in a landfill and could be recycled when the plant opens.

[123] Recycling Today, "TenCate Grass launches synthetic turf recycling program", 9/20/2022.; Scrapware, "Navigating Challenges and Opportunities of Recycling Synthetic Turf", 11/12/2023.; VLS Environmental Solutions, "From Turf to Energy: The Innovative Recycling Journey at VLS Environmental Solutions", 10/19/2023.

[124] SportsField Management, "Recycling and repurposing synthetic turf", 4/28/2022.

[125] Synthetic Turf Council, "STC Technical Guidelines", Accessed 3/25/24.

[126] Stakeholder Feedback, European Chemicals Agency, "Granules and mulches on sports pitches and playgrounds", Accessed 3/24/24.

[127] Sports Field Management Association, "Best Management Practices for the Sports Field Manager: A Professional Guide for Environmental Sports Field Management"", April 2021.

[128] Stakeholder feedback

install a natural grass field over a synthetic turf field. However, maintenance of grass fields by mowers and nutrients from fertilizers could still lead to runoff into nearby waterways.[129]

Besides the location, materials and design choices of the field have a large impact on runoff and treatments needed to maintain the field for optimal playability. For natural grass, a best management practice is either to keep the native soil or modify it slightly. In general, native soil fields have adequate nutrients and have a high water-holding capacity, which reduces the need for fertilizers and heavy irrigation. However, a lot of native soil fields have inadequate drainage and are prone to uneven surfaces, so adding sand into existing soil can significantly improve drainage. Adding sand to a field does have a high upfront cost but it can improve playing conditions and increase available hours of use.[130]

Maintenance. Due to high traffic and use of athletic fields, soils become heavily compacted, increasing runoff and the leaching of nutrients and pesticides from the soil into waterways.[131] Field maintenance can impact (increase or decrease) the amount of pollutant runoff from fields. Practices such as cultivating the fields through coring, vertical mowing, and other methods can remediate compacted soils and improve the overall health of the field.[132] Field owners should also consistently monitor irrigation during the year because the growing cycle of natural grass require different amounts of water at different times of year. Monitoring irrigation can prevent overwatering and waste of water.

Integrated pest management is also a best practice for maintaining natural grass athletic fields.[133] It entails developing a maintenance plan to manage pests using the least amount of pesticide possible.[134] However, there are situations where pesticide is necessary to be used to keep the surface safe and consistent for optimal playability.[135] When pesticides are applied, it can remain in the soil, air, and make its way into drinking water supplies and nearby waterways.[136] Pesticide residue can persist in the environment for a long time, some of which are classified as carcinogen pollutants in many countries, including the United States.[137]

---

[129] Frank, K. W., "Maintaining Waterfront Turf to Preserve Water Quality", 5/28/2015.
[130] SFMA, "Best Management Practices for the Sports Field Manager", April 2024.
[131] Petrovic, A. M., "Managing sports fields to reduce environmental impacts", 11/2004.
[132] Cornell College of Agriculture and Life Sciences, "Sports Field Management", Accessed 3/24/2024.
[133] SFMA, "Best Management Practices for the Sports Field Manager", April 2024.
[134] Northeast IPM, "Outdoor BMPS: Athletic Fields", Accessed 4/01/2024.; U.S. Department of Agriculture, "Practice Integrated Pest Management", Accessed 3/24/2024.; Maryland Department of Agriculture, "IPM for School Lawns", Accessed 3/24/2024.
[135] Sports Field Management Association, "Best Management Practices for the Sports Field Manager: A Professional Guide for Environmental Sports Field Management"", April 2021.
[136] Alengebawy, A. et. al., "Heavy Metals and Pesticides Toxicity in Agricultural Soil and Plants: Ecological Risks and Human Health Implications", 2/25/2021.; US EPA, "Framework for Conducting Pesticide Drinking Water Assessments for Surface Water", 9/2020.
[137] Yen Le, T. T., et. al., "Environmental Health Risk: Hazardous Factors to Living Species", 2016.,; Schwingl, P. J., et. al., "A Tiered Approach to Prioritizing Registered Pesticides for Potential Cancer Hazard Evaluations: Implications for Decision Making", 2/12/2021.

Best practices also recommend *not* applying fertilizer prior to expected heavy rainfall to avoid nutrient runoff and using organic fertilizer when possible.[138] [139] The Maryland Department of the Environment regulate application of fertilizers and pesticides to minimize environmental harm. Using organic fertilizer and pesticides is recommended as well to reduce environmental impacts of maintenance.[140] The Parks Department is currently conducting a pilot study on organic management for their fields.[141]

Finally, identifying the optimal amount of water for an athletic field can reduce water use. Natural athletic fields can require up to 1.5 million gallons of water per acre per year.[142] However, the Sports Field Management Association reports athletic fields are often overwatered and recommends water conservation measures such as using recycled water for irrigation and installation of rain sensors to pause irrigation during rain.[143]

Turfgrass Choice. New innovative turfgrass varieties are being bred to be more drought and wear tolerant and to need less pesticides, fertilizers, and water.[144] Research into the best turf grass for use for athletic fields and in different climates is widely conducted, including at the University of Maryland.[145] As Maryland is located in a transition climate where it can be difficult to grow grasses, UMD's research can be useful to help choose the right type of grass for athletic fields in the County.[146]

[138] SFMA, "Best Management Practices for the Sports Field Manager", April 2024.; Tidaker, P., et. al., "Energy use and greenhouse gas emissions from turf management of two Swedish golf courses", 1/2017.
[139] SFMA, "Best Management Practices for the Sports Field Manager", April 2024.
[140] SFMA, "Best Management Practices for the Sports Field Manager", April 2024.
[141] Stakeholder Feedback
[142] Claudio, Luz, "Synthetic Turf: Health Debate Takes Root", 3/11/2008.
[143] SFMA, "Natural Grass Athletic Fields", Accessed 3/24/2024.
[144] Cheng, H., et. al., "Environmental and Health Impacts of Artificial Turf: A Review", 2014.
[145] University of Maryland, "Paint Branch Turfgrass Facility", Accessed 3/24/2024.
[146] Stakeholder Feedback

Chapter 3. Injury and Health Impacts

This chapter summarizes research on physical injury safety concerns of synthetic turf compared to natural grass playing fields. In its research, OLO found limited and inconclusive research on the health effects of synthetic turf compared to natural grass. Due to limited reported research to date on injuries on the latest versions of synthetic turf, there is little consensus on whether the risk of injury is greater than on natural grass surfaces.

In general, natural grass fields appear to be slightly safer to play on compared with synthetic turf, but OLO found that a significant number of recent health safety studies relied on older data. Below are some important caveats to consider.

Almost all studies OLO reviewed highlight that the type of playing field – synthetic turf or natural grass – cannot be solely responsible for injury results. The studies highlight that many other factors impact the injury rate of participants including:

- Demographic data on participants, particularly age and gender;
- Type of shoe/cleat;
- Weather conditions;
- Level of competition; and
- Type of event (match vs. practice).

A significant number of studies examined play on older generation synthetic turf fields with crumb rubber infill. First- and second-generation synthetic turf was known to cause increased injury risk when compared with natural grass. Newer generation turf is composed of longer fibers and a sand and/or rubber infill that more closely mimic the properties of natural grass. Several studies that compared injury rates on new generation synthetic turf fields compared to natural grass fields found no difference in injury rates. There are only two fields remaining in Montgomery County with crumb rubber infill.

A key factor in the overall safety of a field – both synthetic turf and natural grass – is proper maintenance. If not properly maintained, all playing surfaces can be unsafe and cause injuries.[147] For natural grass fields in particular, the level of maintenance directly corresponds to the consistency and safety of its surface.[148]

A key factor that impacts rates of injury among athletes playing on synthetic turf is infill weight, which can vary based on field construction. The amount of infill in a synthetic turf field can greatly affect the impact between an athlete and the ground.

[147] Stakeholder Feedback
[148] Stakeholder Feedback

The remainder of this chapter summarizes research on injury rates for athletes playing on synthetic turf compared to natural grass and describes research on best practices for preventing injuries on both types of surfaces. Note that many studies only focus on one sport (e.g., football, soccer, rugby) or one type of injury (ACL, MCL, etc.). As noted above, injury rates in studies also vary based on sex, age, and intensity of play, making apples to apples comparisons difficult. This is an area of ongoing research.

A. Overview of Research Available on Injuries Related to Synthetic Turf and Natural Grass

OLO found three literature reviews/meta-analyses that summarized findings from multiple studies on injuries on synthetic turf compared with natural grass athletic fields, summarized below in subsections A-C. Subsection D summarizes findings from other relevant studies that OLO identified.

a. American Journal of Sports Medicine

Researchers completed a systematic review of injury studies comparing synthetic turf and natural grass in 2022, summarizing findings from 53 studies conducted from 1972 through 2020.[149] The review notes all studies that showed a higher rate of injury on natural grass were funded by stakeholders within the synthetic turf industry. The sections below summarize the review's findings.

General Injury Rates. Studies on new generation turf found similar overall injury rates on synthetic turf compared to natural grass fields. Of the 32 articles that compared overall injury rates on synthetic turf and natural grass, over half **(53%)** reported no difference in overall injury rates between the playing surfaces, **38%** reported a higher overall injury rate on synthetic turf, and **9%** reported a higher overall injury rate on natural grass.

Old vs. New Synthetic Turf. In eight studies of older generation turf, **75%** of studies showed a higher risk of injuries on synthetic turf compared to natural grass. In 18 studies of new generation turf compared to natural grass, **72%** found no difference in risk of injury between playing surfaces.

Foot and Ankle Injuries. Studies looking at foot and ankle injuries on synthetic turf compared to natural grass for both old and new generation turf found a slightly higher rate of injuries on synthetic turf compared to natural grass. Twelve out of 25 studies (**48%**) reported a higher rate of foot and ankle injuries on synthetic turf. Ten studies (**40%**) found no difference in foot and ankle injury rates between playing surfaces and three studies (**12%**) reported a higher foot and ankle injury rate on natural grass.

Knee and Hip Injuries**.** Similar knee and hip injury rates were reported between playing surfaces for soccer athletes on new generation turf, but football players, particularly those at high levels of competition, were more likely to sustain a knee injury on synthetic turf than on natural grass.

[149] Gould, H. P., et. al., "Lower Extremity Injury Rates on Artificial Turf Versus Natural Grass Surfaces: A Systematic Review", 5/20/2022.

Of the 32 studies that compared knee injury rates on synthetic turf and natural grass, over half of these studies (**59%**) found no difference in knee injury rates. Eight studies (**25%**) reported a higher knee injury rate on synthetic turf, and five studies (**16%**) reported a higher knee injury rate on natural grass. Over two-thirds of studies (**74%**) that examined knee injury rates on new generation turf reported no difference in knee injury rates between the playing surfaces. For soccer athletes, a majority of studies (14/16; **88%**) reported no difference in knee injury rates on turf compared to natural grass. For football athletes, eight of 14 studies (**57%**) reported higher knee injury rates on synthetic turf compared to natural grass. Eleven of 13 studies (**85%**) that compared hip injury rates on synthetic turf compared to natural grass found no difference in hip injury rates between playing surfaces. The remaining two studies (**15%**) reported a higher hip injury rate on natural grass.

b. Sports Field Management Association (SFMA)

In 2019, the SFMA also completed a literature review of studies comparing injury rates on synthetic turf compared to natural grass.[150] Note that several of these studies examined injuries in professional sports. Findings include:

- A 2019 study found college athletes experienced higher levels of PCL and ACL[151] injuries on synthetic turf compared to natural grass but found no statistically significant difference in rates of MCL, medial meniscal, or lateral meniscal injuries.
- A 2019 study found that as infill surface weight decreased, football trauma (lower total and substantial traumas, concussions, surface impacts, and muscle tendon overload) significantly increased across numerous playing conditions – including a variety of cleat designs, adverse weather conditions, and turf ages.
- In a 2019 study of NFL players, playing on synthetic turf resulted in a 16% increase in lower extremity injuries per play than playing on natural grass. The study, however, found no difference between Achilles tendon rupture rates and playing surface.
- A 2019 study reviewing injury rates in MLS soccer players found 1.54 injuries per game on synthetic turf and 1.49 injuries per game on natural grass. Data showed a higher incidence of overall ankle injury, Achilles injury, and ankle fracture on synthetic turf while showing no difference in foot injury, forefoot injury, or knee injury between the surfaces.
- In a 2018 Swedish study on soccer players aged 7-12, researchers found that injury risk was increased on synthetic turf when compared with natural grass.

[150] Sports Turf Managers Association, "Injury Research Review – Natural Grass and Synthetic Turf Playing Fields", 11/2019.

[151] The ACL and PCL are two major ligaments that crisscross within the knee joint, allowing the knee to flex and extend without sliding back and forth. The ACL prevents the tibia from sliding forward along the femur, while the PCL prevents the tibia and femur from sliding backwards. Very Well Health, "How ACL and PCL Injuries Differ", 5/4/2024.

- A 2018 study examining the effect of playing surface on match injury types for professional rugby union clubs found no difference in overall injury risk between synthetic turf and natural grass. Data showed a higher rate of concussion and chest injuries on natural grass and a higher rate of thigh hematoma and injury to players being tackled on synthetic turf.

c. Journal: *Injuries and Sports Medicine*

Eight studies that analyzed injury rates on early generation synthetic turf compared to natural grass found that turf resulted in higher overall injury rates. In studies that analyzed injury rates on newer generation synthetic turf compared to natural grass, researchers found no difference in injury rates between the playing surfaces. However, researchers found that newer generation turf has been associated with higher rates of specific injuries for specific athlete populations.[152]

- In 13 studies examining hip injury rates, 11 studies (**85%**) found no difference in hip injury rate between playing surfaces, no studies found higher rates of injury on synthetic turf, and two (**15%**) found higher rates of injury on natural grass.
- In 32 studies examining knee injury rates, 19 studies (**59%**) found no difference in injury rates between playing surface, eight (**25%**) found higher rates of injury on synthetic turf, and five (**16%**) found higher rates of knee injury on grass fields.
- Among studies involving soccer athletes, 14 out of 16 studies (**88%**) found no difference in injury rates between the playing surfaces. Comparatively, eight out of 14 studies (**57%**) examining American football found a higher rate of knee injury on synthetic turf fields compared to natural grass.
- In 25 studies examining foot and ankle injury risk, ten studies (**40%**) found no difference in injury rates between playing surfaces, 12 studies (**48%**) found higher injury rates on synthetic turf, and three (**12%**) found higher injury rates on natural grass.
- Data from all competitive sports showed a lower rate of concussion or head injury on synthetic turf compared to natural grass. Data showed no difference in the rate of concussion or head injury on synthetic turf compared to natural grass among female athletes. Data from both American football and rugby showed a decreased risk of head injury or concussion on synthetic turf compared to natural grass but soccer showed no statistical difference in rate of concussion or head injury between turf and grass. Data from another study, however, showed a disproportionately high rate of concussion and an increased risk of severe concussion among high school football players on synthetic turf compared to natural grass.[153]

[152] Gosnell, G. G., et. al., "Playing Surface and Injury Risk: Artificial Turf Vs. Natural Grass", 7/11/2022.
[153] *Ibid*.

d. Other Studies

OLO identified various other studies that further found inconclusive results about whether playing on synthetic turf resulted in more injuries for participants:

- A 2023 study examining injury rates across several sports (soccer, rugby union, field hockey, Gaelic football, hurling and Australian football) found that hamstring injuries were 1.5 times higher on natural grass compared with synthetic turf surfaces.[154]
- Data in one 2022 study showed female soccer players had a significantly higher risk of ACL injury (1.18 times higher) playing on synthetic turf versus natural grass while data showed no significant difference in injury rates for male soccer players on synthetic turf compared to natural grass.[155]
- A 2021 study of high school athletes found that athletes were 58% more likely to sustain injuries on synthetic turf compared to natural grass. In particular, lower extremity, torso, and upper extremity injuries were significantly more likely to occur on synthetic turf. Data also showed that athletes playing football, girls soccer, boys soccer, and rugby had higher injury incidences on synthetic turf.[156]
- A 2019 study compared rates of different knee injuries on natural grass versus synthetic turf across all three divisions of NCAA football. Researchers found that PCL tears occurred almost three times as often on synthetic turf compared to natural grass. Athletes playing at lower levels experienced ACL tears 1.6 times more often on synthetic turf compared to natural grass.[157]
- A 2000 nationwide study compared concussion rates in both collegiate and high school football players. Researchers found that head contact with synthetic turf was disproportionately associated with concussions and found that more serious concussions were associated with synthetic turf compared to natural grass.[158]
- In a 2005 study looking at high school lacrosse games, data showed that abrasion injuries accounted for 19% of all injuries on synthetic turf while only accounting for 0.5% of injuries on natural grass.[159]
- A 2022 study on English professional rugby players' injuries on natural grass, synthetic turf, and a hybrid surface found that injuries sustained on synthetic turf fields were more severe than

---

[154] Maniar, N., et. al., "Incidence and prevalence of hamstring injuries in field-based team sports: a systematic review and meta-analysis of 5952 injuries from over 7 million exposure hours", 5/4/2023.
[155] Xiao, M., et. al., "Increased Risk of ACL Injury for Female but Not Male Soccer Players on Synthetic Turf Versus Natural Grass: A Systematic Review and Meta-Analysis", 8/12/2022.
[156] Paliobeis, A., et. al., "Injury incidence is higher on synthetic turf compared with natural grass in high school athletes: a retrospective cohort study", 08/2021.
[157] National Center for Health Research, "Injuries Related to Artificial Turf", Accessed 3/24/2024.
[158] Ibid.
[159] Ibid.

injuries on a natural grass field or a hybrid field and took longer to recover compared to injuries on a natural grass field.[160]

- A 2019 study found that while abrasion injuries do occur on synthetic turf playing fields, the reported incidence rates are relatively low compared to other more severe injuries and injury rates varied across sports and level of play. The study also highlighted a disparity between players' perceptions of abrasion injuries and the level of evidence of abrasion injury risk on synthetic turf playing surfaces.[161]
- A 2020 study on MRSA on playing fields found that MRSA bacteria survived for up to 96 hours on synthetic turf infill (average 13 hours) and 24 hours on synthetic turf fibers (average four hours). Data showed that survival time varied among infill types but did not vary among differing types of turf blades. The abrasive nature of synthetic turf can play a significant role in the onset of MRSA infections.[162]

B. Impact of Heat on Health

Because grass leaves release water vapor and the evaporation of that water vapor leads to cooling, grass fields rarely get above 100° Fahrenheit. The surface temperature of synthetic turf, however, increases greatly in hot weather (especially hot summer months) and can routinely reach temperatures over 150° F. OLO reviewed the few studies available on the impact of heat of synthetic turf on field users. Note there have been essentially no new studies in recent years.

One of the largest studies conducted on the temperature of synthetic turf fields was conducted at Brigham Young University (BYU) in 2002.[163] The study found that the surface of a synthetic turf field averaged 117° F while a natural grass surface averaged 78° F under the same conditions and asphalt averaged 109° F. The temperature two inches below the synthetic turf surface was 28° hotter than the natural grass surface. Researchers at BYU found that while irrigation cooled a synthetic turf surface from 174° F to 85° F, the surface temperature rose back to 120° F within five minutes during the summer in Utah.

[160] National Center for Health Research, "Injuries Related to Artificial Turf", Accessed 3/24/2024.
[161] Twomey, D. M., et. al., "Abrasion Injuries on Artificial Turf: A Systematic Review", 05/2019.
[162] Keller, M., et. al., "The Fate of Methicillin-Resistant Staphylococcus aureus in a Synthetic Turf System", 4/9/2020.
[163] Sports Field Management Association, "Natural Grass Athletic Fields", Accessed 3/24/2024.

From other studies:

- Researchers in Hong Kong found in 2021 that people in three age groups (children, young athletes, and adults) all experienced a longer heat stress duration when exercising at a synthetic turf sports field compared to a natural grass field. In particular, children suffered a 24% longer extreme danger duration on synthetic turf.[164]

- In 2012, the Penn State Center for Sports Surface Research measured surface temperatures for infill alone, synthetic grass fibers, and a full synthetic turf system and found that all synthetic materials reached higher temperatures than grass when heated outdoors and indoors (with a sun lamp). The study found the maximum surface temperatures during hot, sunny conditions averaged from 140° F to 170° F.[165]

- A 2010 study from the University of Missouri Turfgrass Research Center showed synthetic surface temperatures were regularly 50° to 70° F higher than natural grass surface temperatures. On clear, blue-sky days in midsummer where air temperatures were 98° F with calm winds, temperatures would exceed 160° F on synthetic turf surfaces. Temperatures on natural grass surfaces under these conditions ranged between 99° and 102°.[166]

- OLO spoke to academic experts and found it is widely agreed upon by the literature that radiant heat is significantly higher on synthetic turf fields. Young children who are naturally shorter in stature than adults and closer to the ground are especially susceptible to heat given off by synthetic turf during play. Experts recommend having a heat policy in place for synthetic turf and that people not play on synthetic turf when it goes above a certain temperature.[167] See Chapter 6 for MCPS' synthetic turf heat policy.

[164] Playing on natural or synthetic turf sports field? Assessing heat stress of children, young athletes, and adults in Hong Kong Liu, Z. and Jim, C. Y., "Playing on natural or artificial turf sports field? Assessing heat stress of children, young athletes, and adults in Hong Kong", 12/2021.
[165] Toxics Use Reduction Institite, "Athletic Playing Fields and Artifiical Turf: Considerations for Municipalities and Institutions", 09/2020.; National Recreation and Park Association, "Synthetic Sports Fields and the Heat Island Effect", 5/8/2019.
[166] Sports Field Management Association, "Natural Grass Athletic Fields", Accessed 3/24/2024.
[167] Stakeholder Feedback

C. Best Practices for Preventing Injuries

Athletic fields must function properly for athletes by providing firm footing, resistance to tearing and cushioning on impact. Routine maintenance of athletic fields, both natural grass and synthetic turf, is always challenging and can be hindered by labor shortages, inadequate funding and unrealistic expectations. The following provide some best practices for how to maintain fields to help prevent injuries among users.

General Field Maintenance. Discussed in more detail in Chapter 6, general field maintenance is paramount in ensuring the safety and health of those using athletic fields. For both types of playing fields, maintenance should include measuring field hardness periodically.[168] For natural grass fields:[169]

- Several practices can reduce soil compaction, which creates a harder surface for natural grass fields. Examples include rotating or shifting field layout; changing the location of daily practices so athletes are not concentrated on the same area of the field; and conducting regular aeration of the field.
- Practices to prevent and repair worn areas include: seeding often and with the right grass species; increasing the mowing height and never removing more than 1/3 of the grass leaf blade in a single mowing; fertilizing fields based on soil test results; keeping traffic off heavily used areas by rotating or shifting the field; using portable goals and goal posts; moving practice drills to a different location; and restricting all use of game fields to a minimum and not allowing unofficial play on a field.
- Reduction of weeks through increasing mowing height and mowing frequency; watering deeply and infrequently; conducting a soil test to determine soil conditions; and applying seed whenever turfgrass density is reduced.
- Management of puddles and muddy areas, includes the restriction of use when a field is too wet; using topdressing to repair low spots and level the playing surface of a field; and conducting aeration to help with compacted soil and improving water infiltration.

For synthetic turf fields, some best practices include:

- Sweeping and dragging to keep the carpet fibers in an upright position;
- Using a vacuum or leaf blower to remove debris after each use;
- Scanning fields for rips and performing seam repairs immediately;
- Cleaning difficult to remove items with special solvents and cleansers; and
- Treating with anti-microbial products to remove bacterial growth.[170]

---

[168] Field hardness is measured with an impact test called GMAX that measures the ability of a field surface to absorb shock. It's measured as a number and the higher the number, the harder the surface. Industry standards specify that synthetic turf fields should stay at, or below, a GMAX of 165.

[169] Sports Field Management Association, "Improving Field Safety for Athletes", 11/2017.

[170] Cornell College of Agriculture and Life Sciences, "Sports Field Management", Accessed 3/24/2024.

Level of Infill. The properties of synthetic turf infill vary and can significantly impact the play on a field surface. Maintenance should include loosening and redistributing of infill (to improve footing, reduce static electricity and improve the look of the field) before each game. One study of high school football turf fields found that as infill surface weight decreased, football trauma significantly increased across numerous playing conditions. There were significant differences in injury incidence between infill weights related to severity of injury, knee trauma, injury category, primary type of injury, type of tissue injured, lower extremity joint and muscle trauma, cleat design, injuries under various environmental conditions, and age of playing surface. As a result, researchers reported high school football fields should minimally contain 6.0 pounds of infill per square foot.[171]

Synthetic Turf Heat Concerns. The temperature of the surface of synthetic turf fields is a significant concern. The high surface-level temperatures on synthetic turf fields can lead to dehydration, burns and blisters, and heat stroke. Some practices to address excessive heat include:

- Fields should be monitored for temperature levels and organizations should develop heat guidelines. Practices should be scheduled either in the early morning or late evening to avoid peak high-temperature times. MCPS is a leader in this and has instituted the following protocol:
    - Anytime the outdoor temperature exceeds 80 degrees, coaches exercise caution in conducting activities on synthetic turf fields.
    - When outdoor temperatures exceed 90 degrees, coaches may hold one regular morning or evening practice (before noon or after 5 p.m.).
    - When the heat index is between 91–104 degrees between the hours of noon and 5 p.m., school athletic activities are restricted on synthetic turf fields to one hour, with water breaks every 20 minutes.[172]
- Irrigation is the most common method utilized to reduce the temperature of synthetic turf fields; however, under sunny, hot conditions, irrigation only cools the surface of a field for a short period of time.[173]
- New synthetic turf technology is emerging that includes environment-friendly infill that can absorb water and provide a cooling effect on the field. New infill products made of cork, hemp, and organics have arrived in the market offering advanced technology and better cooling features. Infills made of pinewood are popular. T°Cool[174] advertises itself as an eco-friendly, super absorbent polymer that cools the synthetic turf surfaces by coating the infill. Note that these technologies are new and unstudied. The properties of these fields may work for only a limited time, cleat

[171] Meyers, M. C., "Incidence, Mechanisms, and Severity of Game-Related High School Football Injuries Across Artificial Turf Systems of Various Infill Weights", 03/2019.
[172] Montgomery County Public Schools, "Weather and Heat Guidelines", Accessed 3/24/2024.
[173] Sports Turf Online, "Is There Any Way to Cool Synthetic Turf?", 6/20/2011.
[174] T Cool Turf, "Synthetic Turf Cooling Infill", Accessed 3/26/2024.

interaction may impact the efficacy of new field technology, and new technology may have increased maintenance requirements.[175]

Shoe/Cleat Choice. Player safety can be affected by the surface on which they are playing and type of shoes they are wearing. Factors that can influence impact with the ground include type of surface, the material and fit of the playing shoe, and the weight and stance of the player. In order to help reduce injuries, experts recommend athletes wear sport-specific, surface specific, and even weather specific shoes/cleats.[176]

[175] Massey, R., et. al., "Artificial Turf Infill: A Comparative Assessment of Chemical Concerns", 3/23/2020.
[176] Davie, R., et. al., "Cleat - Surface Interface and Lower Extremity Injuries", 9/28/2023.

Chapter 4. Synthetic Turf Legislation and Social Equity

This chapter provides an overview of legislation passed across the country that addresses various aspects of synthetic turf athletic fields. This chapter also summarizes the limited discussion of social equity surrounding synthetic turf fields.

A. Legislation and Regulations of Synthetic Turf Fields

In recent years, many state and local jurisdictions have adopted legislation and regulations related to the use of synthetic turf, ranging from bans on specific infill types to requirements for more transparency in recycling of turf. This section lists and describes these measures.

The significant disagreement by stakeholders over the use of synthetic turf fields has led to much proposed legislation aimed at limiting the use of synthetic turf, such as outright bans on publicly funded synthetic turf fields.[177] *Note this list only contains legislation that has been adopted*.

- Several communities across the country have banned, severely restricted, or passed moratoriums on the use of synthetic turf including Millbrae (CA), Westport (CT), Wayland (MA), Oaks Bluff (MA), Littleton (MA) and Concord, (MA).[178]
- In 2017, the District of Columbia placed a moratorium on the installation or construction of any synthetic turf fields with crumb rubber or other materials made from recycled tires on property owned or leased by the District.[179]
- In 2020, the town of Sharon, Massachusetts, adopted a synthetic turf moratorium prohibiting installation of any synthetic turf on any land owned by the town for a period of three years. The moratorium made an exemption for synthetic grass carpets made of plant-based bioplastic, which is either biodegradable or compostable and certified to not contain PFAS.[180] The moratorium ended in 2023. OLO could not find updated information on the use of synthetic turf in Sharon.
- In 2022, while not officially banning synthetic turf fields with PFAS, the Mayor of Boston ordered that no new synthetic turf be installed in city parks.[181]
- In 2023, California passed legislation that allows local governments to ban synthetic grass in neighborhoods due to potential health impacts. The bill is limited to residential properties.[182]

[177] Maryland Legislature, "Bill H.3948 - An Act Prohibiting State and Municipal Contracts for the Purchase and Installation of Artificial Turf Fields", 6/26/23.; NJ.com, "Jersey Shore Town Working to Ban Artificial Turf, Official Says", 1/12/2024.
[178] New Republic, "Artificial Turf is Tearing Towns Apart", 5/14/2024.
[179] Code of the District of Columbia, "§ 10–168. Moratorium on crumb rubber synthetic turf.", Effective 6/12/2024.
[180] Town of Sharon, MA, "Article III Artificial Turf Field Moratorium", Adopted 10/12/2020.
[181] The Guardian, " Boston Bans Artificial Turf in Parks Due to Toxic "Forever Chemicals"", 9/30/2022.
[182] California Legislative Information, "SB-676 Local Ordinances and Regulations: Drought-Tolerant Landscaping", Adopted 10/8/2023.

- In 2023, New York passed a bill that prohibits the sale and installation of synthetic turf that contains PFAS, effective at the end of 2026.[183]
- In 2024, Vermont passed a bill that prohibits the sale and installation of synthetic turf fields containing PFAS, effective in 2028.[184]
- In 2024, Colorado passed a law prohibiting the installation of nonfunctional turf, (which includes synthetic grass) on almost all state government, commercial and industrial properties. The law does not prohibit the use of functional turf, such as athletic fields for recreation. The law instead bans use of synthetic turf in areas that "receive little, if any use."[185]

Maryland and Montgomery County Legislation. Montgomery County and Maryland have both passed legislation regarding synthetic turf athletic fields.

- In 2024, the State of Maryland passed legislation requiring the Maryland Department of the Environment (MDE) to conduct a study on synthetic turf, existing synthetic turf fields in the state, and the synthetic turf industry in the state, including the chain of custody process for recycling synthetic turf.[186] The intention of the law is to increase transparency in the disposal of synthetic turf as it is currently difficult or not possible to track either the recycling or disposal of synthetic turf materials.
- Another Maryland bill passed in 2024 prohibits the selling and installation of playground surfacing materials that contain: (1) more than 90 parts per million of lead; (2) fluorinated organic chemicals, which includes PFAS chemicals; and (3) more than 20 milligrams per kilogram of PAH.[187] As synthetic turf materials have been shown to contain these chemicals, this bill would prohibit the installation of a synthetic surface with these chemicals above the limit.
- In Montgomery County, the County Council passed a resolution in 2015 that required plant-derived materials be used for infill in synthetic turf fields.[188] The resolution states the Council plans to approve only the use of plant-derived infill materials for new synthetic turf playing fields that the County funds or contracts.[189]

---

[183] Adirondack Daily Enterprise, "Artificial Turf at SLHS Would Be A Mistake", 5/18/2024.
[184] Vermont Public, "Bill That Would Restrict PFAS in Consumer Products Heads to Governor", 5/7/2024.; State of Vermont, "S-0025 As Passed by Both House and Senate Official", Adopted 1/20/2023.
[185] State of Colorado, "Senate Bill 24-005: An Act Concerning the Conservation of Water in the State Through the Prohibition of Certain Landscaping Practices", Adopted 3/15/2024.
[186] State of Maryland, "House Bill 457: Environment - Synthetic Turf", Effective 10/1/2024.
[187] State of Maryland, "House Bill 1147: Environment - Playground Surfacing Materials - Prohibitions", Introduced 2/7/2024.
[188] Montgomery County Council, "Resolution 18-58: Use of Plant-Derived Materials for Infill in Artificial Turf Playing Fields", Adopted 2/10/2015.
[189] Montgomery County Council, "Resolution 18-58: Use of Plant-Derived Materials for Infill in Artificial Turf Playing Fields", Adopted 2/10/2015.

European Union Ban on Crumb Rubber Infill

The European Chemicals Agency (ECA) found the largest single source of microplastic pollution in EU member states is rubber infill material from synthetic turf fields. Due to this, the EU banned crumb rubber infill in 2023 and will be shifting to alternative infill, such as cork and other plant-based infill.

Sources: European Union Chemicals Agency, "Microplastics"; Environmental Science & Technology, "The European Union Ban on Microplastics Includes Synthetic Turf Crumb Rubber Infill: Other Nations Should Follow Suit"

B. Social Equity in Synthetic Turf Athletic Fields

OLO found no sources of research or scholarship discussing equity issues surrounding the use of synthetic turf versus natural grass athletic fields. OLO was able to identify discussions that occurred in some local communities regarding equity, summarized below.

The following organizations supported the installation of synthetic turf fields to increase equity:

- In 2015, the Toronto Public Health Department determined synthetic turf fields have the potential to enhance health equity by providing opportunities for outdoor recreation within low-income, high-density neighborhoods and can provide playing surfaces that can used by persons with mobility aids.[190]

- In 2018, the City of Vancouver established VanPlay – its parks and recreation master plan that addresses equity, population growth, and evolving demographics. In order to "create a Field Allocation Policy to facilitate equitable access to fields and support sport development," Parks recommended increasing both natural grass and synthetic turf fields in the City.[191]

- In 2019, the City of Asheville, NC decided to construct a synthetic turf football field at Asheville Middle School to accommodate additional use by the Parks and Recreation Department. The city used an Equity Matrix to make this decision and found that "Building on our community benefit partnership will allow students and the community access to something they haven't had in the past."[192]

[190] Toronto Public Health, "Health Impact Assessment of the Use of Artificial Turf in Toronto", April 2015.
[191] City of Vancouver, CA, "2040 Asset Targets: Field Sports", Accessed 4/15/2024.
[192] Asheville City Schools, "Renovation of Fields Increase Equitable Access for Student-Athletes and the Community", Accessed 4/15/2024.

- In a 2022 debate at Wilbur Cross High School in New Haven, CT, students and parents reported that while they would love to play on a natural grass field, the current fields are unsafe for play. They reported their field was a disadvantage — "a fundamental inequity that hurts students before they even turn 18" and requested the installation of a synthetic turf field.[193]

The following organizations presented views on inequity associated with the installation of synthetic turf fields:

- In 2022, the Mystic Valley (MA) NAACP released a statement about the conversion of Roosevelt Park into a synthetic turf field. The NAACP concluded the project: (1) would remove the only living green space for passive recreation enjoyed by the lowest income earners; (2) would create a "pay to play" scheme which will only allow active participation on the field if a child or adult has paid to participate in organized sports; and (3) would increase the heat island effect and flooding of the neighborhood.[194]

- In 2022, the City of Malden, MA activists asked city officials to halt plans to install synthetic turf over public green space, claiming city officials have targeted less affluent, more diverse neighborhoods whereas no turf fields were planned for more affluent neighborhoods. One resident noted, "the environmental racism that exists in Malden is real and the city's action needs to be pointed out."[195]

Fairfax County, Virginia Equity in Fields.[196] As sports participation in Fairfax County steadily increased, County officials recognized the current inventory of athletic fields was insufficient to meet increasing demand. In 2013, the Fairfax County School Board, in partnership with the Fairfax County Board of Supervisors and the Fairfax County Park Authority Board, created a joint Synthetic Turf Task Force to make recommendations on the development and use of synthetic turf fields in the County. At the time of the task force, the County had 67 synthetic turf fields in place or in development.

Overall, the task force determined that the conversion to synthetic surfaces allows for year-round play and play in most weather conditions, which significantly increases the amount of playable time to help address the shortage of available field space. The task force concluded that synthetic turf fields across the county also allow for more equitable use between school and community groups in all geographic

[193] New Haven Independent, "Turf Tops Grass After Field Repair Debate", 12/21/2022.
[194] NAACP Mystic Valley Area Branch, "Mystic Valley Area Branch NAACP Addresses Environmental and Racial Injustices at Roosevelt Park", 4/21/2022.
[195] Malden Advocate, "Malden Hopeful as Boston Bans Toxic Turf", 10/7/2022.
[196] Fairfax County Government, "Synthetic Turf Task Force: Overview, Findings, and Recommendations", 07/2013.; Fairfax County Government, "Athletic Services and Community Use Scheduling", Accessed 4/15/2024.

areas. The task force gave several recommendations specific to the development of new synthetic rectangular turf fields:

- Synthetic turf fields and lights within school sites should be standard components in new school construction and future capital improvement renovation schedules. At high school sites, the two-field model should be standard for rectangular sports use.
- The community should continue to support partnership opportunities directed at future synthetic turf field development, maintenance and replacement.

The County implemented the Fairfax County Field Allocation Plan to help ensure community use of synthetic turf fields is scheduled in an equitable manner and that as many youths and adults as possible can participate on the fields:

- Neighborhood Community Services will attempt to schedule organizations on turf fields within their geographic area based on their estimate of hours requiring turf field use;
- Hours scheduled to groups that have MOUs governing their allocations will be counted towards their turf field allocation;
- Groups that contribute financially to the development of a turf field after December 1, 2008, will have 50 percent of their assigned time on that field; and
- Specific hours will be designated for adult participation and will not be counted toward the total available turf field hours for youth organizations.

Fairfax County solidified their approach to equity in 2016 when they passed One Fairfax, a joint racial and social equity policy of the Fairfax County Board of Supervisors and School Board. Under this policy, Fairfax County will provide "*[a] parks and recreation system that is equitable and inclusive by providing quality facilities, programs, and services to all communities; balancing the distribution of parks, programs and facilities; and providing accessible and affordable facilities and programs.*"

Montgomery County Public Schools Equity Considerations

In addition to the equity discussions identified above, Montgomery County Public Schools representatives believe the construction of synthetic turf athletic fields at high schools leads to a more equitable use of fields. MCPS cites the following equity issues: (1) grass fields result in limited availability and often, as a result, ensuring gender and sport equity is extremely challenging; (2) when use of grass fields has to be limited, players may have to travel to alternate playing fields, which is more difficult for populations who have transportation challenges and concerns; (3) athletes who practice on a different surface than a game is played on may be at a disadvantage; (4) schools with artificial turf have a competitive advantage, as they can practice and play games during inclement weather, when grass fields are closed; (5) schools with artificial turf have more time available for youth and community games, providing a stronger pipeline of participation; (6) schools with artificial turf have an additional teaching space for physical education, allowing for a more consistent surface and relieving use of grass practice fields; and (7) all county and state championship games must be played on synthetic turf so those schools with grass may be at a disadvantage. This is also discussed in the stakeholder feedback chapter of the report.

Chapter 5. Best Practices in Installation and Maintenance

Maintenance is key to providing a safe and consistent surface for users of both synthetic turf and natural grass athletic fields. This chapter presents best practices in the installation and maintenance of athletic fields. It also includes summaries of information from case studies conducted in other jurisdictions and provides an overview of available research on hours of use by type of field.

A. Best Practices in Installation and Maintenance of Fields

The level of maintenance of athletic fields directly affects the safety and consistency of a field. Both synthetic turf and natural grass athletic fields require regular maintenance to ensure optimal playability for users. However, the costs, equipment, and types of maintenance differ for the two types of fields.

Synthetic Turf

Installation. The construction and installation of a synthetic turf field is generally conducted by a synthetic turf supplier. Typically, a field requires a site survey prior to installation to identify needed pre-construction preparation work, such as drainage and electricity infrastructure for lights. Installation of a synthetic turf field involves three main steps:

- *Pre-clearing the Site*. The work involved in pre-clearing a site depends on whether the work involves replacing/renovating an existing field or building an entirely new field. Replacing a field involves removing and replacing the old field and supporting layers (e.g., shock pads). Constructing a new field can require additional work such as removing trees, excavating and grading the land, and other pre-construction activities.
- *Foundation and Structural Layers.* Contractors ensure the foundation of the playing field is structurally sound and has sufficient drainage infrastructure.
- *Synthetic Turf Installation*. Contractors install mats, padding, synthetic turf carpet and infill material. Following installation, lines and logos are painted and installed.[197]

The time frame required for installation varies depending on factors such as pre-construction needs. Synthetic turf suppliers report installation of an average synthetic turf field takes approximately three to six weeks after plan and permits are finalized.[198] The replacement of a new field after it has reached its end of life is estimated to take a few weeks.[199]

[197] Sports Venue Calculator, "Synthetic Turf Field Installation: Considerations for schools, clubs and municipalities", Accessed 4/30/24.
[198] Keystone Sports Construction, "How Long Should It Take To Plan, Budget, & Install New Turf Fields", Accessed 4/30/24.; The Motz Group, "What is the Timeline for Installing New Synthetic Turf For Your School?", 5/23/2019.
[199] Sports Venue Calculator, "Synthetic Turf Field Installation: Considerations for schools, clubs and municipalities", Accessed 4/30/24.

Maintenance. It is a misconception that synthetic turf fields are maintenance free.[200] Synthetic turf requires regular maintenance, which impacts the longevity of a field's useful life, safety and playability. Many synthetic turf companies have contractors to conduct regular maintenance and G-MAX testing on fields.[201] Best practices for maintenance of synthetic turf fields include:

- *Surface Debris Removal***.** Debris such as food, leaves, and trash accumulate on the field should be regularly removed. Debris removal options include sweepers, blowers, cleaning products, and magnets for removing metal debris.[202]
- *Cleaning.* Special solvents and cleansers specifically designed for synthetic turf fields are recommended for cleaning after every game.[203] It is also recommended to treat the field with anti-microbial products to remove bacterial growth weekly to monthly depending on use.[204]
- *Grooming***.** Grooming synthetic turf fields helps keep the plastic grass blades upright and infill evenly distributed across the field. Experts recommend brushing a field with specific equipment designed for synthetic turf at least every three to four weeks during playing seasons or as much as once a week depending on use.[205]
- *Adding Infill*. Field usage causes infill levels to decrease over time. Infill is essential for safety as it provides shock absorption and cushioning. Infill levels should be routinely monitored, and infill should be replaced when it falls below the target infill depth range.[206]
- *Repairs*. Seam rips and other tears can occur on synthetic turf fields, especially with heavy usage. Damage should be repaired as soon as possible.
- *G-MAX Testing***.** G-MAX testing, which is required for most synthetic turf warranties, measures the shock absorption and shock impact for fields and its users. The Synthetic Turf Council set the G-MAX standard at or below 165.[207]

The above best practices apply to all types of infill in synthetic grass fields. OLO found little information available related to best practices for maintaining newer, organic and plant-based infills other than through synthetic turf supplier websites. However, OLO spoke with maintenance crews and athletic field managers and compiled information on some additional maintenance required for organic infills:

---

[200] Cornell College of Agriculture and Life Sciences, "Synthetic turf: Sports field management", Accessed 4/30/2024.; Stakeholder Feedback
[201] Stakeholder Feedback
[202] Penn State University, "From the Field: Proper Synthetic Turf Maintenance Maximizes Player Safety and Performance", Accessed 4/30/2024.
[203] Cornell College of Agriculture and Life Sciences, "Synthetic turf: Sports field management", Accessed 4/30/2024.
[204] Ibid.
[205] Ibid.
[206] Penn State University, "From the Field: Proper Synthetic Turf Maintenance Maximizes Player Safety and Performance", Accessed 4/30/2024.
[207] Synthetic Turf Council, "Glossary of Terms", Accessed 4/30/2024.

- Plant-based infills can grow weeds, which must be weeded by hand.
- Some organic infills compact more quickly than rubber infill and must be replaced.
- Some plant-based infills must be kept at a certain moisture level to reduce compaction and prevent infill from flying away, which requires watering. An irrigation system or water cannon is typically used to keep the field at a proper moisture level.
- Plant-based infills provide slightly cooler ambient temperatures on synthetic turf fields but only by about two to four degrees Fahrenheit. Accordingly, field maintenance may still require watering the field to cool it during hotter days.

Natural Grass

The playability of a natural grass field depends on many factors, including:

- Construction of the field with proper drainage;
- Management of the field;
- Maintenance of the field;
- The type of use, e.g. competition, training and non-sporting use; and
- The prevailing weather conditions.[208]

A natural grass field's hours of use can be increased if it is properly managed and maintained. The following summarizes best practices in natural grass field maintenance.

Construction and Renovation. The construction of natural grass fields has a direct impact on available hours of use, safety, and drainage capabilities. Experts report that taking shortcuts when constructing a natural grass field can seriously impair the quality and maximum hours of use of a field.[209] For rainy climates, experts recommend a sand-based and climate appropriate variety of grass for optimal playability.[210] The seven main components to natural grass field construction are:

- *Base Grading***.** Base grading on a site ensures a level base and allows water to run off properly. For athletic fields, experts recommend building a crown, which is the elevated center portion of a sports field that provides a slope for water to run off. The height of the crown is dependent on the types of sports and activities played on the field, as there are different height preferences.[211]
- *Material Selection***.** In many sand-based fields, experts recommend installing fine gravel and different sized particles of sand above drainage infrastructure to allow for the rapid drainage of

[208] Ground Management Association, "How Much Use Can a Pitch Take?", Accessed 4/30/2024.
[209] Oregon State University, "Best Management Practices for Construction of Sand-based, Natural Grass Athletic Fields", 09/2015.
[210] Ibid., Stakeholder Feedback
[211] Ohio State University, "Field Crowns and Surface Drainage, 4/27/2017.; Oregon State University, "Best Management Practices for Construction of Sand-based, Natural Grass Athletic Fields", 09/2015.

water. Installation should be done with specialized and lighter weight equipment that will not compact the base of the field during installation.[212]

- *Subsurface Drainage***.** If the water table is close to the surface, experts recommend installing drainage lines under a field to lower the water table. Drainage lines are also recommended if subsoils are impermeable and water would remain in the roots of grass for extended periods of time. Drainage lines can be dug using specialized equipment and should be uniform in size and distance apart.
- *Irrigation Installation.* Irrigation is especially important for the health of sand-based fields, which cannot achieve maximum usefulness without irrigation during dry periods. Automatic irrigation systems are recommended for sand-based fields for optimal water control.[213]
- *Sand Selection***.** Native soil fields with large amounts of clay are not suitable for intensive due to poor drainage and increased compaction during use.[214] Soil in Montgomery County tends to be clay heavy and, therefore, native soil fields struggle to drain during periods of heavy rainfall.[215] Sand-based fields can alleviate this issue by providing better drainage, which can increase the available hours of field use. There are many types of sand-based construction, varying by size of particles, amount of sand use, and placement of the sand.[216]
- *Grass Selection.* There are various types of grass, some of which are suited for warm weather and some more suited for cold weather. Considerations when picking out grass varieties include appropriateness of climate and a grass' wear tolerance.[217] Maryland is in a transition zone where temperate and subtropical climates meet, experiencing both cold and hot weather. Grasses suited to both warm and cool weather require extra care and attention to keep the surface consistent and safe for users and free from pests and diseases.[218] OLO notes emerging grass technologies and research, some based out of the University of Maryland, are exploring new grass varieties for optimal playability and safety year-round.[219]
- *Grass Establishment.* When grass is first planted, a maintenance plan should be developed to care for the new field and ensure its health. Maintenance plans require flexibility to deal with changes a field may experience over its lifetime. Most fields will require aeration, mowing,

[212] Oregon State University, "Best Management Practices for Construction of Sand-based, Natural Grass Athletic Fields", 09/2015.
[213] Ibid.
[214] Ibid.
[215] My Green Montgomery, "Understanding Montgomery County Soil", 3/22/2020.
[216] Michigan State University, "Sand Cap Build-up Systems for Michigan High School Fields", 01/2008.; Oregon State University, "Best Management Practices for Construction of Sand-based, Natural Grass Athletic Fields", 09/2015.
[217] Oregon State University, "Best Management Practices for Construction of Sand-based, Natural Grass Athletic Fields", 09/2015.
[218] University of Maryland Extension, "Starting a New Lawn", 2/20/2024.
[219] College of Agriculture and Natural Resources, "Roots in Research Newsletter - Paint Branch Turfgrass Facility 2022", Accessed 4/30/2024.

nutrient and pesticide applications, reseeding, water, and specialized spot treatments for high traffic areas.[220]

Managing Usage. Significant use and traffic on natural grass fields causes soil compaction and can lead to an inconsistent surface with divots and bare patches. Natural grass fields need time to recover following use. However, due to demand, many communities schedule more events than a natural grass field can tolerate, harming the health of fields.[221] Strategies to prolong the life of natural grass fields include:

- Rotating sports and activities between multiple fields;
- Limiting the use of fields to only necessary events, especially during periods of rainy weather;
- Changing the location of practices on the field daily to reduce wear on high traffic areas;
- Using portable goal mouths that can be moved around the field to limit wear near goals;
- Conducting warm-ups and drills off the field and outside of painted numbers;
- Spreading seed of fast germinating grass species in wear areas before games and practices; and
- Educating field users about the importance of rotating traffic and use patterns on fields to maintain safety and optimal playability.[222]

Finally, natural grass fields must be closed periodically for maintenance during the winter season so that dormant grasses are not injured by heavy traffic.[223]

Maintenance. There are many best practices associated with maintaining grass fields for optimal playability. Athletic fields usually require more intense management (such as nutrient management) than most other grass uses due to the following factors:

- Fields receive very intensive traffic and wear, often on a year-round basis;
- Fields are often used when grasses are not actively growing;
- Fields require rapid recovery for playability and safety reasons;
- Pesticide use is often limited on public fields. However, adequate nutrient programs are essential to minimize weed encroachment and potential disease problems; and
- Poorly maintained fields, including inadequate nutrient applications, are prone to soil erosion and severe compaction, which can result in significant injury and safety Issues for field users.[224]

[220] Oregon State University, "Best Management Practices for Construction of Sand-based, Natural Grass Athletic Fields", 09/2015.
[221] Stakeholder Feedback; Sports Field Management Association, "Natural Grass Athletic Fields", 4/30/2024.
[222] Sports Field Management Association, "Natural Grass Athletic Fields", 4/30/2024.; Stakeholder Feedback
[223] Environmental Health Perspectives, "Synthetic Turf: Health Debate Takes Root", 03/2008.
[224] University of Maryland, "Nutrient Management Guidelines for Athletic Fields in Maryland", 06/2014.

Best practices for maintaining natural grass athletic fields differ based on climate, variety of grass, and usage of the fields. General best practices that apply to a wide variety of fields include:

- *Mowing***.** Mowing creates a dense and uniform playing surface, which promotes safety and enhanced playability. Experts recommend mowing frequently, sometimes two to three times a week.[225] Mowing frequency should increase during periods of rapid turfgrass growth and decrease during periods of slower growth. Grass clippings should be either removed or widely dispersed because leaving excessive clippings can smother underlying grass. Removed clippings can be composted or dispersed in natural areas.[226]
- *Nutrient Management***.** The proper application of nutrients can improve a field's health and stress resistance, allowing grass to grow stronger. Phosphorus, potassium, sulfur, and nitrogen are commonly used nutrients for athletic fields. Experts recommend soil testing every one to two years to identify needed nutrients. Fertilizers and nutrients like nitrogen must be applied according to state and local regulations.[227]
- *Irrigation***.** Irrigation supplements seasonal water deficiencies to meet plant needs. The amount of irrigation a field needs depends on climate, amount of rainfall, type of soil and variety of grass. Irrigation systems need to be managed carefully to ensure fields are neither under or over watered, as either can affect plant health, can waste water, and can increase pest and disease pressure.[228]
- *Cultivation and Surface Management.* Cultivation practices (such as aeration) relieve soil compaction, reduce excessive organic matter that encourages disease and creates suboptimal playing conditions and promote drainage. Cultivation should be conducted when grass is actively growing to allow quicker recovery. Field use determines the type of aeration and frequency required based on soil compaction, soil type, and the amount of organic matter present.[229]
- *Disease and Pest Control***.** Most grass disease is caused by fungi that invade the leaves, stems or roots of plants. While close and frequent mowing is a best practice for athletic fields, it aggravates grass diseases by spreading pathogens and creating "wounds" in the grass, increasing susceptibility to disease.[230] Certain varieties of grass are more resistant to disease. However, most athletic fields will need to be appropriately treated for diseases, which can

[225] Sports Field Management Association, "Natural Grass Athletic Fields", 4/30/2024.
[226] Sports Field Management Association, "Best Management Practices for Sports Field Managers", 04/2021.
[227] Ibid.
[228] Ibid.
[229] Ibid.
[230] University of Maryland, "Diagnosing Common Lawn and Athletic Field Diseases", 03/2003.

include use of pesticides.[231] Pesticides should be applied as sparingly as possible and as specified by state regulations.[232]

B. Case Studies

OLO reviewed a handful of case studies found about the installation and maintenance of both synthetic and natural grass athletic fields. Note that information cannot easily be compared between studies because variables differ, such as costs, site characteristics, soil base and level of maintenance. Further, there are some details and nuances the case studies do not provide. For example, hours of use are included but different sports cause different amounts of wear and tear on a field.[233]

Case Study #1. Amherst-Pelham Regional Public Schools (MA)

A consultant for the Amherst-Pelham Regional Public Schools prepared a study in 2021 to provide cost estimates for installation of several types of fields. Cost estimates for a native soil natural grass field, a sand-based natural grass field, and a synthetic turf field were used for capital planning purposes.[234]

The data show synthetic turf has higher life-cycle costs but lower average cost per hour of use because synthetic turf fields can be used significantly more than natural grass fields. OLO notes that while estimates are based on a 12-year life cycle, most synthetic turf fields last eight to ten years.[235]

Cost Estimates of Fields for Amherst-Pelham Regional Public Schools (2021)

	Native Soil Natural Grass	Sand-Based Natural Grass	Synthetic Turf
Initial Construction Cost	$600,000	$850,000	$1,500,000
Annual Maintenance Cost	$25,000	$30,000	$10,000
Replacement Cost After 12 Years	$200,000	$250,000	$850,000
Life-Cycle Cost Over 12 Years	$1,100,000	$1,460,000	$2,500,000
Hours of Recommended Use Per Year	100 to 200	350 to 600	1,500 w/o lights
Average Cost Per Hour of Use	**$420**	**$200**	**$140**

[231] Ibid.
[232] Sports Field Management Association, "Best Management Practices for Sports Field Managers", 04/2021.
[233] Stakeholder feedback
[234] Amherst Pelham Regional and Public Schools, "Technical Memorandum for Track and Field Improvement Scenarios", 2/11/2022.
[235] Amherst Pelham Regional and Public Schools, "Technical Memorandum for Track and Field Improvement Scenarios", 2/11/2022.

Case Study #2. Springfield, Marblehead, and Martha's Vineyard (MA)

The Toxics Use Reduction Institute (TURI), which has conducted research on the health and environmental implications of synthetic turf, conducted studies on three Massachusetts towns with organically managed grass fields, in Springfield, Marblehead, and Martha's Vineyard. These towns also have synthetic turf fields that were not explored in depth. The case studies were designed to illustrate the costs and hours of use associated with natural grass fields.[236]

Springfield. The City of Springfield organically manages 67 acres of natural grass fields, park areas, and other public properties that include two large sports complexes and one single, full-sized soccer field. Overall, estimated annual costs to 12 organically managed grass fields are $98,080, which includes products, maintenance and labor. The case study did not explore installation costs.

Annual maintenance costs for the 2.7 acre full-sized soccer field are $1,820 with approximately 1,050 annual hours of use (includes practices, games and informal activities). The case study notes that soccer is played year-round on the field, with spring and fall seasons for organized play lasting 14 weeks each. Estimated hours for walk-on and other informal uses are included in the 1,050 total annual hours of use.

Key maintenance practices for the fields in Springfield include:

- Soil testing for physical, chemical, and biological characteristics;
- Aerating grass and soil;
- Applying organic fertilizer and soil amendments, with two rounds of fertilizer in the summer and fall; and
- Regular mowing.[237]

The city installed an irrigation system in some fields for ease of watering but the case study does not clearly identify which fields. Annual maintenance costs for the irrigation system are estimated to be $7,200.[238]

The study included information on cancellations of activities on the fields in Springfield, which differs by sport. It was found that:

- Baseball games and practices are rescheduled during active rain as puddles form on the clay areas in the infield. An estimated total of 30 baseball games and practices were cancelled in 2018 at two different parks due to rain.

[236] Toxics Use Reduction Institute, "Building an Organic Maintenance Program for Athletic Fields: Guidance from Experts and Experienced Communities", 04/2021.
[237] Toxics Use Reduction Institute, "Natural Grass Playing Field Case Study: Springfield, MA", 06/2019.
[238] Toxics Use Reduction Institute, "Natural Grass Playing Field Case Study: Springfield, MA", 06/2019.

- Soccer, football, and lacrosse games and practices are generally cancelled during heavy rain for an extended period of time. Across three parks in Springfield, soccer, football, and lacrosse games and practices were cancelled 22 times in 2018.

Marblehead. Marblehead has managed all its natural grass playing fields organically since 2002. To achieve this, the town has focused on building and maintaining fields with an active microbial life in the soil and a strong root system. Maintenance practices they highlight as key to their success are frequent aeration and mowing, soil testing, and the use of organic fertilizer and soil amendments. The town estimates the annual cost of organic management of their fields (including products and inputs) at $4,250 - $4,500 per acre.

The case study presents hours of use for a school's two U10[239] soccer fields, which are used for both spring and fall sports and during the summer. The 65,340 square foot field can accommodate up to four teams simultaneously. The data on hours in the next table do not account for cancellations. There were five day-long closures in 2018, three due to rain and two due to heat.

Estimated Hours of Use for Two U10 Soccer Fields in 2018, Marblehead MA

Sport	Age Group	Season	Total Use: Hours Per Week	Weeks Per Season	Approximate Hours Per Season
Soccer	Youth	Spring	32	13	410
Soccer	Youth	Fall	25	13	330
Soccer	High School	Fall	18	13	230
Lacrosse	Youth	Spring	9	13	120
Recess	Middle School	Spring & Fall	7	37	250
Youth Soccer Activities (Summer)					310
Sports Clinic (Summer)			--	--	380
Total Scheduled Use					**2030**
Informal Recreation Hours (Summer)			14	13	180
Estimated Total Hours			**--**	**--**	**2210**

The case study discussed costs (but not hours) associated with the town's one synthetic turf field. Installed in 2013, the 1.5-acre field cost $1.3 million and was privately funded. The leagues that use the field pay a fee to support maintenance costs. Costs for maintenance of the synthetic field include:

- $10,000 - $14,000 for purchase of a Gator utility vehicle with a brusher attachment (+$7,500);
- $1,000 - $1,400 in labor costs for grooming by a town Recreation and Parks employee (½ day every 3 weeks in spring/fall and ½ day every four weeks in the summer; and

[239] Refers to the soccer field dimensions for youth games which is smaller in area compared to professional full-sized sports fields.

- $6,000 for two applications of a disinfectant product.

Total annual maintenance costs are estimated at $7,000 to $7,400. The town explored contracting out maintenance, including grooming, cleaning, de-compacting, field inspection, impact testing and infill depth measurements. A bid for two maintenance visits per year was $5,300. An additional bid for disinfectant services six times per year was $6,800.[240]

Martha's Vineyard. Martha's Vineyard works with a non-profit organization to fund five athletic field complexes with organically managed natural grass fields. The annual costs per acre range from $4,900 to $10,600 depending on the field's needs. The case study notes prices are more expensive than a mainland community, due to costs associated with transporting materials and equipment to the island. The estimated hours of use and total maintenance costs for three fields are summarized below.[241]

Estimated Hours of Use and Maintenance Costs Five Athletic Fields, Martha's Vineyard 2019

Fields	Field Usages	Field Size	Est. Total Use Hours, Fall/ Spring	Est. Annual Maintenance Costs*
School – Two Fields	Soccer, Lacrosse, Recess, and PE	2.75 Acres	890	$20,100 ($7,320 per acre)
School – Main Field	Soccer, Track, PE, Recess, Informal Recreation	0.6 Acres	470	$2,930 ($4,880 per acre)
Community Field	Soccer, Baseball, Informal Recreation	1.4 Acres	390	$11,400 ($8,150 per acre)

*Maintenance costs include labor, supplies and equipment rentals.

Case Study #3. Sports Field Management Association

Prior to 2016, the Sports Field Management Association (SFMA)[242] published cost and hour estimates for maintaining synthetic and natural grass fields at multiple facilities. Note the outdated costs can still be useful to show differences in costs associated with various levels of field maintenance.

The table below summarizes costs from the North Scott Community School District in Eldridge, Iowa. **North Scott Schools also has a sand-based soccer field that is 114,000 sq ft and costs $20,378 per year to maintain.**[243]

[240] Toxics Use Reduction Institute, "Natural Grass Playing Field Case Study: Marblehead, MA", 11/2020.
[241] Toxics Use Reduction Institute, "Natural Grass Playing Field Case Study: Martha's Vineyard, MA", 12/2020.
[242] Prior to 2022, they were known as the Sports Turf Managers Association.
[243] Sports Field Management Association, "Natural Grass Athletic Fields", Accessed 4/30/2024.

Costs of Natural Grass Fields North Scott Community School District (IA)

	Labor Hours	Labor Cost	Product Cost	Total Activity Cost
Native Soil Area Field (214,000 sq ft.)	266	$5,246	$18,009	$23,255
Natural Grass Football Stadium (70,000 sq ft)	225	$4,920	$9,077	$13,998

Other costs provided by SFMA include:

- Michigan State University provided information on their budget for maintenance on their three year-old synthetic turf field with crumb rubber. Annually, the estimated cost of maintenance is $22,760 which includes enhanced maintenance for optimal playability. A date for this cost estimate is not available.
- To maintain the Cincinnati Bengal's 100,000 square foot natural grass field at their practice facility, costs $17,000 annually and takes 870 hours of maintenance. At their stadium field, which is a synthetic turf field, it costs $15,500 annually and takes 355 hours of maintenance.[244]

Case Study #4. Nantucket Public Schools (MA)

The Nantucket Public Schools conducted a comparative cost study for natural grass and synthetic turf fields, assuming a period of 25 years to account for at least two synthetic turf cycles. The assumptions made were as follows:

- The natural grass field will include an irrigation system.
- The synthetic turf field will have a concrete perimeter anchor curb, stone base with pipe drainage, flat drain panels, a shock pad, blended turf fabric with woven backing, and organic infill similar to Brockfill.[245]
- The total costs of each field include standard maintenance equipment but do not include costs for auxiliary components such as fencing, lighting and seating.
- Maintenance services wages/costs for Nantucket Public Schools (NPS) staff are $75 per hour.

The tables on the next page summarize the cost assumptions in the study. The maintenance costs are based on the school district's current practices and through competitive bids received for basic maintenance of both types of fields.

[244] Sports Field Management Association, "Natural Grass Athletic Fields", Accessed 4/30/2024.
[245] According to the supplier, Brockfill is made from wooden chips, manufactured in a way to eliminate splinters and fungus, so that the infill is soft to the touch. From: Polytan, "Brockfill", Accessed 4/30/2024.

Amended Topsoil Natural Grass Field Assumed Costs, over 25 Years for Two Fields

Initial Field Construction (Topsoil, soil amendments, sod)	$1,300,000
Irrigation Water Costs ($1,000/year)	$25,000
Maintenance Equipment	$80,000
Current Level of NPS Maintenance Activities (Estimated 490 hours/year)	$918,750
Irrigation System Maintenance (Subcontracted at $3,000/year)	$75,000
Topdressing/Oversodding (Subcontract at $30,000/year)	$750,000
Expanded Maintenance Activities* ($44,000/year)	$1,100,000
Total Estimated Costs Per Field	**$4,248,750**
Assuming 1000 Hours of Field Usage/Year (Highest maintenance level)	**$169.95/Hour of Use**

*The costs for expanded maintenance activities are based on an increase in maintenance activities for the highest level of natural grass maintenance, which includes monthly deep tine/core aeration with two topdressing applications, two additional overseeding/sodding operations and three additional fertilizations per year.

Synthetic Turf Field Assumed Costs, over 25 Years for Two Fields

Initial Field Construction	$2,100,000
Specialized Maintenance Activities	$30,000
Turf NPS Maintenance Activities (Estimated 112 hours/year)	$210,000
Infill Topdressing Supplies (Subcontract at $3,000/ year)	$75,000
Replacement Turf Installation (Includes recycling of initial turf)	$765,000
Total Estimated Costs Per Field	**$3,180,000**
Assuming 2000 Hours of Field Usage/Year	**$63.60/Hour of Use**

The study found that the cost for two synthetic turf fields would be over $1,000,000 less over 25 years compared to two natural grass fields with the highest level of maintenance. The cost per hour of usage per year is more than twice as much for the two natural grass fields compared to the two synthetic turf fields.[246]

[246] Nantucket Public Schools, "Comparative Costs - Natural Grass/Synthetic Turf Fields", 1/20/2022.

Local Cost and Maintenance Estimates

OLO also obtained information on local costs and maintenance hours required for various types of fields. Maryland Soccerplex (https://mdsoccerplex.org/) provided the following data:

	Synthetic Turf Field	Natural Grass Field
Cost of Construction	$1.4 million	$250K-$750K (varies by type)
Annual Cost of Maintenance	$12,000	$55,000 (varies by field type, grass type, use)
Annual Hours of Use	3,000 Hours	850 hours (cool season grass), 1,200 hours (Bermuda grass)

OLO attended a webinar/town hall meeting entitled "Cultivating Natural Grass Playing Fields: Listening to the Experts" organized by the ANC 3G (one of 37 Advisory Neighborhood Commissions in Washington, DC.). During this meeting, an expert from Virginia Tech shared the following construction costs for natural grass sports fields in the Northern Virginia market provided by one of the east coast's leading sports field design and installation companies.

The estimates do not include additional site work such as engineering, mass grading, stormwater retention, storm drainage, irrigation source, fencing, or lights that might be necessary or wanted.

Type of Field	Price Per Square Foot	Estimated Price (81,000 sq. ft field)
"Minimal" acceptable natural grass field	$5	$405K
Adding Drainage	Add. $7	Add. $567K
Sand Capped Field with Internal Drainage	Add. $8-10	Add. $648K to 810K
Sand Base w/ Irrigation, Internal Drainage, Sod	Add. $12-13	Add. $972K to 1.1m
Synthetic Turf Field	$14-$15	$1.1m to $1.2m
Adding stormwater management	Add. $2-3	Add. $162K to $243K

C. Research on Hours of Use

OLO found there were differing estimates of hours of use that a synthetic turf field and natural grass field can be played on. The following are estimates from a variety of sources:

- The Hoover Met Stadium (Alabama) hosts the SEC Baseball Tournament and the Hoover High School Football team. The Stadium reports that on average, a synthetic turf field can be played on for more than 3,000 hours per year, without necessary resting time. Natural grass athletic fields can be played on for around 600 – 816 hours per year. These estimates consider winter seasons, rain, and other natural occurrences.[247]
- Industry standards indicate that a lit synthetic turf field can accommodate up to 105 hours of use per week (including approximately 48 prime time hours on weekends and evenings). A natural grass field can accommodate 12–14 hours of play per week and requires seasonal closures for field recovery.[248]

Finally, the table below is from 2022 FIFA stadium guidelines describing the recommended maximum usage for football pitches (fields). OLO notes these guidelines are presented for professional usage and illustrates the maximum usage to keep a field at a pristine professional level.[249]

Pitch (Field) Type		Description	Maximum Usage (Hours Per Week)	Life Expectancy (w/ Annual Renovation)
Natural Grass		100% plant-based on a soil/sand rootzone	6	1 to 2 years
Hybrid	Reinforced Rootzone	Synthetic material mixed with natural rootzone	8-10	Up to 5 years
	Carpet-Type	Grass grown on synthetic mat w/ synthetic fibers attached, filled rootzone	8-10	Up to 5 years
	Stitched Fiber	Synthetic fibers stitched into grasses' rootzone	Up to 20	10 to 12 years
Synthetic Turf		100% synthetic material	Up to 20 (Professional use) 40-60 (Community use)	10 years (based on usage)

[247] Hoover Met Complex, "Turf vs. Grass - Outdoor Sports at Hoover Met Complex", Accessed 4/30/2024.
[248] City of Vancouver, CA, "2040 Asset Targets: Field Sports", Accessed 4/15/2024.
[249] Graspro, "Pitch Usage", Accessed 4/30/2024.

Chapter 6. Montgomery County Inventory of Athletic Fields

This chapter presents an overview of Montgomery County's rectangular athletic fields that are publicly owned by Montgomery County Public Schools (MCPS), Montgomery Parks (Parks), or the Department of Recreation (Recreation). The chapter includes an inventory of rectangular athletic fields in the County, including number, type, and location and describes maintenance and scheduling processes for these fields. Community Use of Public Facilities (CUPF) is involved in permitting the use of many of the County's public athletic fields except for fields owned by Montgomery Parks.

Note that this report focuses on permittable rectangular athletic fields – rectangular athletic fields that can be rented by members of the public. The following table provides a very high-level summary of data about athletic fields in the County. OLO compiled data from multiple databases that contained a count of the fields in the County as there was no one central database for the inventory of permittable County fields. Due to this, this may not be an accurate count of all the fields in the County as fields are counted differently across databases.

Note that athletic fields designated as baseball/softball fields are included in these data (but not in the discussion of fields in this report generally) because groups also rent/use baseball/softball fields for other types of activities and sports. **For a full list of all permittable fields in the County, please see the Appendix.**

	Stadium Fields*	MCPS HS Practice Fields**	MS/ ES Fields***	Parks Fields[x]	Recreation Fields	Total Fields
Total Locations	24	25	154	145	7	331[##]
Total Permittable Fields	**24**	**79**	**358**	**313**	**10**	**784**
# Natural Grass Fields (Not BB/SB)	13	33	192	157	5	400
# Natural Grass Fields (BB/SB)^	--	47	163	152	5	367
# Synthetic Turf Fields^^	11	0	3	4	1[#]	19
Responsible for Maintenance	MCPS, Contractor	MCPS, Contractor	Parks, MCPS	Parks	Recreation, DGS, Parks, Contractor	n/a
Responsible for Scheduling	MCPS, CUPF	MCPS, CUPF	CUPF	Parks	CUPF, Recreation	n/a

BB = baseball, SB = softball, HS = High School, MS = Middle School, ES = Elementary School

* Does not include the field at Montgomery Blair High School, which is owned by Parks.

**Includes stadium field at Peary High School

***Also includes fields at Emory Grove Center, Fairland Center, Grosvenor Center, Larchmont/Grace Episcopal Day School, North Lake Center, Radnor Center, Carl Sandburg Center, and Spring Mill Field Office

[x] Parks also operates one indoor synthetic turf field at Wheaton Sports Pavilion (not included in this study).

^ OLO identified baseball and softball fields by internal database field type designation (BBSB). Some of these fields have overlays, which means they can be permitted for activities other than baseball/softball.

^^ Two synthetic turf fields in the County (both Parks) have crumb rubber infill – the remaining fields all have organic infill. The two Parks fields (MLK and Fairland) are tentatively planned to be renovated - Fairland in Spring 2025 and MLK's renovation will begin after Fairland's completion.

[#] A synthetic turf field at North Potomac Community Recreation Center owned by Recreation is not permitted to the public. It is not included in the total permittable fields.

[##] The total field locations do not add up across the rows as the 24 stadium fields at MCPS are counted in the 25 HS Practice fields total for locations.

Two important notes for this chapter – both CUPF and Parks are currently completing studies that may impact athletic field use in the County. CUPF is undergoing a fee study that is reviewing the current fee structure (last updated in FY17) and Parks is undertaking a study that is looking at the current practice of historical use permitting (see discussion in Parks scheduling section below for details on the practice).

A. Montgomery County Public Schools Athletic Fields

Montgomery County Public Schools (MCPS) has numerous types of rectangular athletic fields throughout all three levels of schools. These include high school stadiums with natural grass, high school stadiums with synthetic turf, high school natural grass practice fields (including baseball/softball fields as other teams practice on them), middle/elementary school synthetic turf fields, and middle/elementary school natural grass fields.[250]

Natural Grass Stadium Fields and Practice Fields at High Schools. Of MCPS' 24 stadium fields, 13 are natural grass fields (at 13 schools). MCPS also has 79 natural grass practice fields at 26 County high school locations[251]. Of these 79 fields, 32 are rectangular athletic fields and the remainder are baseball or softball fields.

MCPS staff report that use of natural grass stadium fields is typically limited to high school games. All artificial turf fields and some of the practice fields are typically used by MCPS staff and students during the school day (primarily PE class), varsity and junior varsity sports teams, and community groups after school hours (if available).

Athletic directors report that with limited natural grass practice field space and no access to natural grass stadium fields, they constantly have to move team practices around each season and use local park fields for practice for many teams per school each season (i.e. four soccer teams, two field hockey teams, and two football teams in the fall). MCPS staff identified concerns with equity issues when deciding which teams can practice at various locations and various times, logistical needs to move teams around fields to avoid destroying fields for other sports, and requiring student athletes to drive off campus for practices (raising concerns about equity and environmental impacts).

Synthetic Turf Fields. MCPS has 15 synthetic turf fields at 15 locations in the County: eleven at high schools (listed on the next page), one at Julius West Middle School, and two at elementary schools (Flora Singer and Somerset). Note that the synthetic turf field at Montgomery Blair High School is owned, operated, and maintained by Montgomery Parks, not MCPS, and is classified as a local park.

[250] The City of Gaithersburg owns the fields at Lakelands Park Middle School and Harriet Tubman Elementary School. These fields are not included in this study.

[251] Under the ActiveMontgomery system, fields at Rock Terrace are identified at high school fields and are therefore included under permittable MCPS athletic fields.

List of Synthetic Turf Fields at MCPS Locations

Location	Surface Installation
Gaithersburg High School	2024
Somerset Elementary School	2016
Montgomery Blair High School **	2017
Richard Montgomery High School*	2018
Walt Whitman High School	2018
Albert Einstein High School	2019
Bethesda Chevy-Chase High School	2019
Flora Singer Elementary	2019
Julius West Middle School	2019
Wheaton High School	2019
Walter Johnson High School***	2020
Seneca Valley High School	2021
John F. Kennedy High School	2023
Paint Branch High School	2024
Thomas S. Wootton High School****	2024

*The synthetic turf field at Richard Montgomery was resurfaced in Summer 2018 after its initial installation in 2008.

**The synthetic turf field at Montgomery Blair is owned and operated by Montgomery Parks. A replacement surface was installed in March 2017 after its initial installation in August 2009.

***Walter Johnson's synthetic turf field was initially installed in 2010.

****Thomas S. Wootton's synthetic field was first installed in 2013.

Three MCPS synthetic turf fields with crumb rubber were replaced this year (2024) with organic infill, which were Paint Branch High School, Wootton High School, and Gaithersburg High School. As of 2024, there are no more MCPS fields with crumb rubber infill. [252] All new and replacement MCPS synthetic turf fields and surfaces will have an organic infill mix.

MCPS is one of the few school systems that has placed limits on synthetic turf field use during extreme heat. Because synthetic turf retains more heat and has hotter ambient temperatures compared to natural grass fields, MCPS has guidelines for playing on synthetic turf fields:

- When outdoor temperature exceeds 80 degrees, coaches exercise caution in conducting activities on synthetic turf fields;
- When outdoor temperature exceeds 90 degrees, coaches may hold one regular morning or evening practice, before noon or after 5 PM;

[252] MCPS Correspondence

- When the heat index is between 95-104 degrees between the hours of 12:00 PM to 5:00 PM, school athletic activities are restricted on synthetic turf fields to one hour with required water breaks every 20 minutes; and
- When the heat index is above 105 degrees, all outside activity, including practice or play, is stopped.[253]

Middle and Elementary School Natural Grass Fields. MCPS has an additional 358 fields across 154 MCPS middle and elementary school locations. These fields are primarily used by MCPS staff and students during the school day and community groups during after school and weekend hours.

B. Maintenance

MCPS athletic field maintenance is based on the type of field. Maintenance is completed at different levels and by different organizations, depending upon numerous factors.

High School Natural Grass Fields. All MCPS natural grass stadium fields use Bermuda grass. Individual high schools maintain their athletic fields (stadium and practice) as part of their athletic budget.[254] Some school booster clubs supplement funding for maintenance.

Schools must use MCPS-approved vendors to perform maintenance and a school's athletic director monitors contracts and works directly with vendors. The level of maintenance at each school varies based on field conditions/needs and other athletic funding needs. Schools conduct their own field inspections.

MCPS staff report the only "downtime" for fields to rest is during winter months, when there are no outdoor sports and PE classes do not go outside. Most MCPS high schools do not allow any play other than games on stadium grass fields to help maintain field conditions.

MCPS staff report they are planning on developing a central field maintenance team that will take over high school field maintenance responsibilities from the individual schools. MCPS staff report that they hope this change will lead to MCPS determining weather related closures for its own fields and to eliminating the Adopt-A-Field Program/historical use on MCPS high school fields (see below).

Synthetic Turf Fields. MCPS Department of Facilities Management coordinates the installation and replacement of synthetic turf fields. MCPS uses one contractor, Keystone Sports Construction, for all synthetic turf field maintenance in the County, including:

- Routine maintenance such as sweeping;
- Adding infill as needed;
- Repairing seam rips; and
- Conducting biannual GMAX tests (testing the shock absorbance of fields).

[253] Montgomery County Public Schools, "Artificial Turf Fields Program", Accessed 4/30/2024.

[254] Except for Montgomery Blair's synthetic turf field, which is maintained by Parks and is a local park.

MCPS provides a log of contractor services provided and all GMAX testing results on the MCPS Synthetic Turf Field website.[255]

Middle and Elementary Schools Natural Grass Fields. Parks performs maintenance for most MCPS middle and elementary school fields (see next section). For fields not maintained by Parks, MCPS Facilities conducts maintenance.

i. MCPS Field Maintenance by Parks

Montgomery Parks maintains most middle school and elementary school natural grass fields – maintaining 212 MCPS-owned natural grass fields at 108 middle and elementary school locations.[256] MCPS staff report they are working towards Parks maintaining all MCPS natural grass fields at middle and elementary schools. Fields not maintained by Parks include schools with the least space in the most densely populated areas of the County, either because they do not have natural grass fields big enough to mow/maintain under the contract or they have synthetic surfaces.

To complete maintenance, the Parks contractor creates a weekly Monday Morning Report (MMR) that outlines services needed at each school and sends it to MCPS to review and determine the best days/times to schedule the maintenance (including a review of CUPF permits for the week). The MMR is a dynamic document and can change throughout the day. Parks staff stress that they work closely with MCPS and individual schools to ensure the maintenance schedule works well.

Three athletic field inspectors ensure all services are being performed based on the MMR. The current contract requires the following maintenance:

- Every field gets mowed weekly;
- Infields are dragged weekly[257];
- Regrading of the infields with a box grader once a month;
- Painting of elementary school fields 4x/year; painting at middle school fields weekly;
- Aerification 3x/year;
- Seeding 2x/year (spring and fall); and
- Nutrient applications 4x/year.

One contractor currently performs all these services, with the contract set to expire in the fall of 2024. Parks staff report they would like to geographically divide the County into four quadrants and establish contracts with four individual contractors going forward as it is difficult for one contractor to maintain all required fields across the County.

---

[255] Montgomery County Public Schools, "Artificial Turf Fields Program", Accessed 4/30/2024.

[256] Parks owns and maintains the synthetic turf field at Montgomery Blair High School, discussed in the Parks section below.

[257] While this report focuses on rectangular sports fields, the MMR provided to OLO includes the dragging of infields for baseball and softball fields, to show the frequency of maintenance for all fields at schools.

ii. Adopt-A-Field (AAF) Program

The MCPS Adopt-A-Field (AAF) Program allows organizations to perform some maintenance on MCPS grass fields (e.g., mowing, weeding, maintaining infields, etc.) in exchange for "blocked off" days and times for the organization to use the field. The remaining permittable time is open to the public. Ten MCPS fields currently are part of the program. The AAF program will expire at eight schools (Churchill, Whitman, Richard Montgomery, Kennedy, Einstein, Walter Johnson, Wootton, and BCC) at the end of the 2024 calendar year. The program will end at Damascus in March 2026 and at Gaithersburg in October 2026.

iii. Scheduling/Permitting

CUPF is responsible for the rental of most MCPS fields through ActiveMontgomery. Natural grass high school stadium fields are only permitted through CUPF if the person/organization requesting the permit receives prior approval from the specific high school's administration. In addition, MCPS athletic directors also have the right to close off any stadium or practice fields for MCPS team use.

For non-league permit seekers, persons/organizations must use ActiveMontgomery to check field availability and make reservations. If there is no availability to meet needs, permit seekers can contact CUPF staff and get on a wait list. CUPF staff will also work with any organizations/groups that cannot find a space or that gets displaced to help locate an alternative option. Municipalities and County partners often have "first dibs" on fields and can displace permitted groups.

CUPF's reservation process prioritizes groups that have historically used a field. CUPF stays in regular communication with leagues that have reserved in the past and if a league permitted a field in the past year, they are offered the same reservations (place/day/time) before the general public. These reservations must be manually entered by CUPF staff.

Fees. Because MCPS fields are permitted by CUPF, CUPF is responsible for setting the rates for school fields rentals. The current rates are as follows:

Field Type	Hourly Rate
Practice Fields – Not Commercial	$5
Practice Fields – Commercial	$10
Synthetic Turf Non-profit/County residents	$125
Synthetic Turf Non-profit/County residents with lights	$160
Synthetic Turf Commercial/Non-County residents	$200
Synthetic Turf Commercial/Non-County residents with lights	$235
High School Stadiums (Grass) – Non-profit/County resident/Youth	$50
High School Stadiums (Grass) – Non-profit/County resident/Youth with lights	$85
High School Stadiums (Grass) – Non-profit/County resident/Adult	$75
High School Stadiums (Grass) – Non-profit/County resident/Adult with lights	$110
High School Stadiums (Grass) – Commercial/Non-County residents	$175

High School Stadiums (Grass) – Commercial/Non-County residents with lights	$210

C. Montgomery Parks Athletic Fields

Montgomery Parks owns and operates 313 athletic fields throughout the County, including 152 baseball/softball fields and four synthetic rectangular turf fields.[258] It is important to note that for the discussion of hours of use data in the next chapter, OLO excluded data from the baseball/softball fields.

Parks divides its fields into two groups: regional parks and local parks. There are 265 natural grass fields in local parks, 44 natural grass fields in regional parks, plus four synthetic turf athletic fields at:

- Fairland Recreational Park;
- Laytonia Recreational Park;
- Blair Local Park (at Blair High School); and
- MLK Recreational Park.

Laytonia's field was most recently installed, approximately five years ago. Laytonia's and Blair's fields have Corkonut infill and Fairland's and MLK's fields have crumb rubber infill.

i. Maintenance[259]

Parks completes almost all its field maintenance in-house and properties are divided into Northern and Southern Divisions. Each division has a senior manager and numerous park maintenance leaders.[260] Senior managers are each responsible for a geographic area and the number of parks per geographic area varies. Leaders are responsible for field and administrative duties including supervising maintenance workers and determining needed maintenance for each field.

Park maintenance leaders create daily field assessment lists for maintenance workers that outline daily renovation/maintenance requirements and any immediate concerns at specific fields. Park staff report that maintenance workers spend a significant amount of time commuting and unloading equipment. For some pieces of maintenance equipment, Parks only has one for the entire County.

Some maintenance workers are dedicated to specific parks (i.e., regional parks often have one or two staff dedicated to athletic fields maintenance). Parks staff report that maintenance activities for natural grass fields vary by season and maintenance frequency is based on industry standards, vacancies, and resources available.

[258] Parks also runs a synthetic turf field located inside Wheaton Sports Pavilion through their enterprise and conducts maintenance for Miracle Field in Germantown, which is a public-private field.
[259] This includes a discussion of Parks maintenance on Parks fields. As discussed earlier, Parks is also responsible for the maintenance on many MCPS middle and elementary school fields.
[260] Within each division, there are multiple management areas that are supported with senior managers, Park managers, Park maintenance leaders, and Park maintenance workers

Current maintenance frequencies are:

- Aerations 3x/year, typically done in the spring;
- Overseeding 3x/year, depending on turf manager discretion and budget (seed is expensive);
- Nutrients are added 3x/year;
- Painting is completed on a weekly basis for regional parks and 2x/month for local parks;
- Mowing frequency for a field is based on time of year, type of grass and field use (e.g., athletic field vs. common areas) – with an estimated 34 cuts per season on local park fields and 60 cuts per season on regional park fields;
- Leaf and debris removal as needed;
- Integrated pest management as needed;
- Applications of topdressing depending upon site locations; and
- Winterization for fields that have irrigation.

Parks senior managers conduct field inspections. While there is no standard inspection schedule, staff report inspections of each field are completed one to three times per month.

Rainout Line

Playing on wet fields can present safety issues for participants and result in significant damage on natural grass fields, which can lead to longer field closures for repairs. Parks is responsible for deciding when and where to close fields due to weather – not only for Parks fields but also select MCPS and Recreation fields. The County has created the Rainout Line (https://montgomeryparks.org/rainoutline/) that has up-to-date operating status for County fields. The website is updated by 3pm on weekdays and 7am on weekends. Staff report the Rainout Line is a tool for communicating with permitted users; unpermitted users are unlikely to use the website.

Maintenance for synthetic turf fields is also primarily completed in-house. Parks staff routinely drag the fields, collect trash and debris, and sweep. Synthetic fields are monitored and maintained on a weekly basis when grooming is completed. Grooming a field typically requires one person using a specialized piece of equipment for about an hour. Parks staff report that fields with Corkonut infill require refilling more frequently than the crumb rubber fields because Corkonut breaks down more quickly.[261] In addition to in-house maintenance, Parks contracts out maintenance needs including GMAX testing, redressing, and issues beyond in-house expertise.

[261] OLO did not receive information on the specific amount and frequency of infill that is required for Corkonut infill.

ii. Scheduling/Permitting

Parks completes its own permitting for all local and regional fields through ActiveMontgomery.[262] Parks permits through two seasons – spring (March 15-August 15) and fall (August 16-November 15). All natural grass Parks fields are closed from late November until March 15th. Approximately 2-3 weeks before each season starts, fields become available for booking by organizations and individuals on a "go live" date.

Certain organizations have priority booking of Parks' fields before the general public, including individual MCPS schools, any organization that has an MOU with Parks, and groups that have historically rented the same field at the same time. Field booking for the last groups, known as historical usage, occurs automatically before the "go live" date for the general public. If a priority organization wants a different field/day/time than its historical usage, it must book during the "go live" period. Some fields for specific gameplay cannot be booked through ActiveMontgomery and organizations/persons must directly email Parks staff to book those fields.

Fees. Parks completes an annual fee study that includes benchmarking, reviewing local jurisdictions, and conducting public hearings. The following table summarizes the current fee rates for Parks fields. There are various minimum hours of use requirements for permits.

Field Type and User	Hourly Rate
Local Parks – Youth	$10
Local Parks - Adult	$15
Regional and Recreational Parks Unlit - Youth	$20
Regional and Recreational Parks Lighted - Youth	$45
Regional and Recreational Parks Unlit - Adult	$30
Regional and Recreational Parks Lighted - Adult	$55
Stadium Athletic Field Unlit - Youth	$50
Stadium Athletic Field Lighted - Youth	$65
Stadium Athletic Field Unlit - Adult	$100
Stadium Athletic Field Lighted - Adult	$140
Synthetic Turf Field Unlit – Non-profit or County resident	$110
Synthetic Turf Field Lighted – Non-profit or County resident	$145
Synthetic Turf Field Unlit – commercial or non-County resident	$180
Synthetic Turf Field Lighted – commercial or non-County resident	$215

[262] As discussed earlier, Parks is responsible for the maintenance on many MCPS middle and elementary school fields. These fields are booked and permitted through CUPF (but also ActiveMontgomery).

C. Department of Recreation Athletic Fields

The Recreation Department owns and operates 11 fields at seven locations.[263] Recreation's one synthetic turf field (with Corkonut organic infill), at the North Potomac Community Recreation Center, is used solely for in-house programming and cannot be rented by community members. Recreation's ten natural grass fields that can be rented by community members are located at six County community centers (not every community center has a field):

Community Recreation Centers	Number of Permittable Fields
Damascus	2
Germantown	3
Mid-County	1
Potomac	2
Ross Boddy	1
White Oak	1

i. Maintenance

The Parks Department maintains two of Recreation's natural grass fields (Germantown CRC and White Oak CRC). Recreation and the Department of General Services (DGS) jointly maintain the natural grass fields at the other four community recreation center locations with rectangular fields (Damascus, Mid-County, Potomac and Ross Boddy). Maintenance at these fields is limited to mowing. DGS pays for two mows a month throughout the year and Recreation pays for an additional two mows per month during peak growing season (April-October), resulting in weekly mowing.

Recreation's one synthetic turf field at the North Potomac Community Recreation Center is maintained through a contractor. The contract includes up to nine maintenance visits per year (one of which includes annual GMAX testing). Specific maintenance service requirements in the contract include:

- General sweeping to remove foreign objects;
- A deep groom, sweep, and rejuvenation to de-compact infill in an effort to maintain appropriate GMAX levels;
- Minor seam and inlay repairs, not to exceed eight repairs, and up to fifteen linear square feet for each repair;
- A magnet sweep and the addition of light infill to high traffic areas;
- One Supersack of Cork for infill replenishment and topdressing of material; and
- Static brushing in multiple directions to redistribute infill and application of anti-static spray, both as needed.

[263] Some fields at these locations are baseball diamond fields; however OLO found that non-baseball organizations often rent out baseball fields so these fields are included in this inventory.

ii. Scheduling/Permitting

Like most MCPS fields, CUPF is responsible for renting Recreation fields through ActiveMontgomery. However, some rentals cannot be made through Active Montgomery and must be called into CUPF.

Recreation has the first right to reserve all Recreation fields for events and the department blocks time before rental times are made available to the public. Recreation staff report they try to limit the department's blocking of permittable time to allow for more community and sports organization use. Recreation does not rent out its synthetic turf field at North Potomac, which is used internally for Recreation leagues, classes, clinics and camps.

Fees. CUPF sets the fees for Recreation fields. Currently, the hourly fee to rent a Recreation natural grass field is $5 an hour for practice and game use. Field camps can rent a Recreation field for $24.50 an hour (non-profit/camp) or $25.50 an hour (for-profit/camp).

Chapter 7. Montgomery County Data on Hours of Permitted Use and Maintenance Hours/Costs

This chapter provides County data on permitted hours of use for Recreation, MCPS and Parks rectangular fields - both synthetic turf and natural grass. The second section of this chapter provides estimates for costs and maintenance hours for fields provided by County staff. The hours of use, costs, and maintenance requirements for both synthetic and natural grass fields are key variables when deciding the best type of field for a given location.

Note: OLO only included rectangular fields in this analysis. Because the availability of rectangular athletic fields in the County is not sufficient to meet demand, teams will often rent baseball/softball fields for practice time for sports typically played on rectangular fields (e.g., soccer). The data in this chapter does not include athletic field use by sports that normally play on rectangular athletic fields but permit baseball/softball fields.

Montgomery Parks and Community Use of Public Facilities (CUPF) provided OLO with FY23 hours of use data for all permittable athletic fields in the County, which include fields owned and maintained by MCPS and Recreation (CUPF data) and Parks (Parks data). These data are limited to fields in which an organization or person can receive a permit to rent out the field and only include information on hours of use during permitted times – data on walk on play, cell phone leagues, etc. are not included. It should also be noted that all synthetic fields and some grass fields have fences to limit access, however the majority of permittable fields are not fenced. ***Note not all fields that are permittable in the County were rented during FY23****.*

A. Parks Athletic Fields Hours of Use

As stated earlier, Parks owns 313 permittable fields in the County, including four synthetic turf fields (Blair High School, MLK Park, Laytonia and Fairland) and 155 rectangular grass fields. Both County Recreational Parks (typically larger parks) and Local Parks have rectangular athletic fields; all synthetic turf fields are in Recreational Parks or at Montgomery Blair High School.

Parks provided OLO with extensive use data for all its athletic fields. To target the data needed for rectangular athletic fields, OLO filtered out any fields that were identified as solely baseball or softball fields or were overlay fields. Any field with an "FS" (field sports) in its description was included. As stated above, this data does not include the permitting of non-baseball/softball sports on baseball/softball fields.

Parks Fields Overall Hours of Use. There were over *70,000* total hours of Parks athletic field rentals in FY23, with an average of *453* hours rented per field for all parks. Comparing natural grass field rentals to synthetic turf field rentals, synthetic turf fields were permitted an average of *1,890* hours per field compared to *415* hours per field for grass fields.

Parks Athletics Fields, FY23 Hours of Permitted Use, by Rectangular Field Type

	Local Parks			Regional Parks			All Parks		
	Synthetic	**Grass**	**All**	**Synthetic**	**Grass**	**All**	**Synthetic**	**Grass**	**All**
# Fields Rented	n/a	141	141	4	10	14	4	151	155
# Hours Rented	n/a	57,222	57,222	7,559	5,459	13,018	7,559	63,680	70,240
Average Hours per Field	**n/a**	**406**	**406**	**1,890**	**546**	**930**	**1,890**	**415**	**453**

The data in the next table show the highest permitted locations throughout the County's parks for rectangular fields. For local parks, the top permitted local parks were all in the Potomac/Chevy Chase area of the County.

Parks Athletic Fields, FY23 Hours of Permitted Use on Rectangular Fields, by Most Permitted Park

Local Parks	**Total Hours**	**Regional Parks**	**Total Hours**
Avenel Local Park (3 Fields, Potomac)	2,396	Laytonia Recreational Park (3 Fields, Gaithersburg) *	3,138
Meadowbrook Local Park (3 Fields, Chevy Chase)	1,675	Montgomery Blair High School (1 Field, Silver Spring) *	3,094
Norwood Local Park (2 Fields, Chevy Chase)	1,613	Martin Luther King Recreational Park (2 Fields, Silver Spring) *	2,134
Falls Road Local Park (2 Fields, Potomac)	1,496	Fairland Recreational Park (1 Field, Burtonsville) *	1,326
Parklawn Local Park (2 Fields, Rockville)	1,325	Northwest Branch Recreational Park (3 Fields, Aspen Hill)	1,262
Winding Creek Local Park (2 Fields, Silver Spring)	1,246	South Germantown Recreational Park (2 Fields, Germantown)	1,088
Rays Meadow Local Park (2 Fields, Chevy Chase)	1,213	Ridge Road Recreational Park (2 Fields, Germantown)	976

*Includes synthetic field

The data in the next table shows total hours of Park fields permitted by sport. **It is important to note that this data is reported by organizations which reserve the permits so the data may not be accurate (organizations may click wrong button, may not fill out field, etc.).** Therefore, this data shows an approximation of the sports permitted for. The data show that soccer is, by far, the largest sport permitted on Parks fields.

Parks Athletic Fields, FY23 Hours of Permitted Use on Rectangular Fields, by Sport

Sport	Hours
Soccer	47,827
Baseball/Softball	10,279
Other*	5,174
Lacrosse	2,236
Football	2,210
Cricket	802
Rugby	405
Field Hockey	63
Blank	1,245

*Other may include other sport types or events or may be the organization not identifying correctly or "mis-clicking"

Parks Fields Hours of Use, by Day/Time. OLO analyzed data to provide a sense of when the fields are being used. The data show similar patterns between grass and synthetic turf:

- Both grass and synthetic turf fields were most often booked in spring and fall months, with May and October being the most booked months;
- Fields were booked evenly throughout the work week and booked more on the weekends;
- During the school/work week, fields were most often permitted for two to three hours during typical after school/work time (5pm-8pm) while during weekend days fields were permitted for much longer periods of time ranging from two to eight hours.

Parks Athletic Fields, FY23 Total Hours Rented, by Field Type and Month

	Local Parks			Regional Parks			All Parks		
Month	**Synthetic**	**Grass**	**All**	**Synthetic**	**Grass**	**All**	**Synthetic**	**Grass**	**All**
January	n/a	--	--	451		451	451		451
February	n/a	--	--	482		482	482		482
March	n/a	3,821	3,821	775		775	775	3,821	4,596
April	n/a	9,911	9,911	695	794	1,489	695	10,705	11,400
May	n/a	**10,389**	**10,389**	**821**	**964**	**1,785**	**821**	**11,353**	**12,174**
June	n/a	6,292	6,292	615	770	1,384	615	7,061	7,676
July	n/a	3,546	3,546	589	421	1,009	589	3,967	4,556
August	n/a	3,575	3,575	586	155	741	586	3,730	4,316
September	n/a	8,481	8,481	823	744	1,566	823	9,225	10,048
October	n/a	**8,889**	**8,889**	**849**	**971**	**1,820**	**849**	**9,860**	**10,709**
November	n/a	2,320	2,320	565	641	1,206	565	2,961	3,526
December	n/a	--	--	312		312	312		312

Parks Athletic Fields, FY23 Total Hours Rented, by Field Type and Day of Week

	Local Parks			Regional Parks			All Parks		
Day of Week	**Synthetic**	**Grass**	**Total Hours**	**Synthetic**	**Grass**	**Total Hours**	**Synthetic**	**Grass**	**Total Hours**
Sunday	n/a	**11,935**	**11,935**	**1,534**	**2,395**	**3,929**	**1,534**	**14,329**	**15,863**
Monday	n/a	6,499	6,499	688	162	850	688	6,660	7,348
Tuesday	n/a	7,434	7,434	1,016	199	1,215	1,016	7,633	8,649
Wednesday	n/a	7,199	7,199	1,043	316	1,359	1,043	7,515	8,558
Thursday	n/a	7,717	7,717	1,050	399	1,449	1,050	8,116	9,166
Friday	n/a	5,957	5,957	767	289	1,056	767	6,246	7,013
Saturday	n/a	10,483	10,483	1,462	1,700	3,162	1,462	12,183	13,644

The data in the next table show the two most commonly permitted time periods each day of the week. OLO removed all permits issued to Montgomery Blair High School for use of its home field (see below for more description).

Parks Athletic Fields, FY23 Most Permitted Time Range, by Time of Day and Day of Week

	Local Parks	Regional Parks	
	Grass	Grass	Synthetic
Sunday	9:00 am - 5:00 pm	9:00 am - 6:00 pm	11:00 am - 5:00 pm
	10:00 am – 5:00 pm	9:00 am - 5:00 pm	9:00 am - 11:00 am
Monday	5:00 pm - 8:00 pm	5:30 pm -7:30 pm	6:00 pm - 9:00 pm
	5:00 pm - 7:00 pm	5:00 pm - 8:00 pm	8:00 pm - 10:00 pm
Tuesday	5:00 pm - 7:00 pm	6:00 pm - 8:00 pm	6:00 pm - 9:00 pm
	5:00 pm - 8:00 pm	5:00 pm - 8:00 pm	6:00 pm - 10:00 pm
Wednesday	5:00 pm - 8:00 pm	5:00 pm - 8:00 pm	6:00 pm - 9:00 pm
	5:00 pm - 7:00 pm	7:00 pm - 9:00 pm	8:00 pm – 10:00 pm
Thursday	5:00 pm - 8:00 pm	3:00 pm - 7:00 pm	6:00 pm - 9:00 pm
	5:00 pm - 7:00 pm	7:00 pm - 9:00 pm	9:00 pm - 11:00 pm
Friday	5:00 pm - 8:00 pm	3:00 pm - 7:00 pm	7:00 pm - 9:00 pm
	5:00 pm - 7:00 pm	9:00 am - 8:00 pm	8:00 pm - 10:00 pm
Saturday	9:00 am - 5:00 pm	9:00 am - 8:00 pm	9:00 am - 8:00 pm
	9:00 am - 12:00 pm	9:00 am - 6:00 pm	9:00 am - 6:00 pm

Parks Fields Use by Type of Grass and Drainage. OLO evaluated the hours of use for Parks natural grass fields by the type of grass on the field. Parks currently has 14 rectangular athletic fields with Bermuda grass (including Hillandale Local Park, which recently opened and therefore does not have FY23 permit data).[264] Data show that:

- Thirteen Bermuda grass fields were permitted for a total of 7,321 hours in FY23, for an average of 563 hours per field; and
- All remaining fescue grass fields were permitted for a total of 55,359 hours at an average of 401 hours per field.

OLO also attempted to look at fields with drainage – Parks staff report that they do not historically track this data but were able to identify two grass fields with drainage – both at Hillandale. Therefore, there is no permitting data available for FY23. However, Parks staff report that they are currently undergoing a five-year study that looks at the installation and maintenance of a top-of-the-line natural grass field so data will be available in the future.

[264] Fields with Bermuda grass include fields at the following parks: Buck Branch, Cabin John (2), Ken Gar, North Four Corners, Pinecrest, Redland, Laytonia (2) Martin Luther King JR, Ridge Road (2), and South Germantown (2)

Park Fields Use by High Schools. One noted complaint of many MCPS high school athletic directors is a lack of practice field availability on MCPS campuses (more detail in stakeholder feedback chapter). Because of the lack of practice fields, many schools must rent out Parks fields (local and regional parks) to accommodate practice times for various teams. While this table cannot provide a complete picture of the hours of use of MCPS high schools on Parks fields, it can provide an estimate of these hours. While Blair High School has the most permitted hours, it is primarily for its home high school fields, which are owned by Parks.

Parks Athletic Fields, FY23 Hours of Use, by MCPS High School

High School	Hours Rented	Stadium Field	Other Permittable Fields at Location (Type of Field by CUPF Designation)
Montgomery Blair	1,852	Synthetic	2 Fields (MCPS, Practice Field) NOTE: HOME FIELD
Rockville	421	Grass	1 (Stadium Field)
Springbrook	401	Grass	None
Damascus	289	Grass	3 Fields (Field Hockey, Shotput Discus, Stadium Field)
Bethesda-Chevy Chase	132	Synthetic	1 Field (Stadium Field)
Clarksburg	106	Grass	2 Fields (Softball, Stadium Field)
Northwest	94	Grass	3 Fields (Practice Field, Practice Field, Stadium Field)
Walt Whitman	64	Synthetic	2 Fields (Baseball, Stadium Field)
Wheaton	46	Synthetic	2 Fields (Baseball, Stadium Field)

OLO also identified 1,702 hours of permitted use by MCPS high schools on MCPS/Recreation fields that are not on their home campus.

Parks Fields Use by Recreation. As discussed in the previous chapter, the Department of Recreation can reserve field space from both CUPF and Parks before permitting is opened to the general public. Recreation provided OLO with data on fields permitted to them for internal programming for Spring/Summer 2023 (data excludes permits issued for baseball/softball and for the Summer Concert Series). This data does not provide a full picture of Recreation use of Parks athletic fields but does provide a sense of typical Recreation use of the fields for a season.

The data show that Recreation had 45 permits issued for Parks athletic fields during Spring/Summer 2023 across 27 locations. These bookings included weekly programming, camps, and one-day specific events. The hours permitted ranged from 1-½ to 9 hours per day.

B. MCPS and Recreation Athletic Fields Use (Data provided by CUPF)

Community Use of Public Facilities (CUPF) permits athletic fields for MCPS, Recreation and a few other locations. CUPF handles permits for 472 fields across Recreation, MCPS, and several other locations. This section provides a summary of the hours of use for fields scheduled and permitted by CUPF.

Recreation. Recreation has ten permittable natural grass fields at six community recreation center locations in the County. Recreation **does not** rent out its one synthetic turf field (North Potomac Community Recreation Center).

MCPS. MCPS has 462 permittable athletic fields throughout 181 MCPS locations (including rectangular fields and baseball/softball diamond fields). Of those, 14 are synthetic turf fields at:

- Bethesda-Chevy Chase High School
- Albert Einstein High School
- Gaithersburg High School
- Walter Johnson High School
- John F. Kennedy High School
- Richard Montgomery High School
- Paint Branch High School
- Seneca Valley High School
- Flora M. Singer Elementary School
- Somerset Elementary School
- Julius West Middle School
- Wheaton High School
- Walt Whitman High School
- Thomas S. Wootton High School

Other Fields. CUPF also permits for an additional ten natural grass fields at seven locations throughout the County, including the Emory Grove Center, Grosvenor Center, Larchmont Grace Episcopal Day School, North Lake Center, Peary High School, Radnor Center, and Fairland Center. There are no synthetic turf fields among these additional locations.

CUPF provided OLO with a significant amount of data on hours permitted. OLO used the same methodology as with Parks data to identify CUPF fields that are rectangular - OLO filtered out any fields that were identified as solely baseball or softball fields. Any field with an "FS" (field sports) in its description was included. As stated above, this data does not include the permitting of non-baseball/softball sports on baseball/softball fields. The remainder of this section summarizes hours of use data for CUPF booked athletic fields.

MCPS/Recreation Fields Overall Hours of Use. There were over 70,000 total hours of rentals in FY23 for fields at MCPS and Recreation locations, with an average of 611 hours per field for all fields. When looking at natural grass fields compared to synthetic grass fields, synthetic grass fields permitted an average of 1,524 hours per field compared to 486 hours per field for natural grass fields.

MCPS and Recreation Athletic Fields, FY23 Hours of Permitted Use, by Field Type

	Turf	Grass	All
# of Fields Rented	14	102	116
# of Hours Rented	21,341	49,589	70,930
Average Hours per Field	1,524	486	611

A note about the permitting of MCPS artificial turf fields – the data below show that approximately half of the total hours permitted were for the school at which the field is located or for MCPS Athletics.

MCPS Artificial Turf Athletic Fields, FY23 Hours of Permitted Use, Reserved by MCPS Schools

Reservee	Hours Permitted
Bethesda-Chevy Chase High School	2,028
Walter Johnson High School	1,355
Kennedy, John F. High School	1,266
Thomas S. Wootton High School	1,133
Gaithersburg High School	1,016
Wheaton High School	946
Seneca Valley High School	769
Paint Branch High School	721
Richard Montgomery High School	451
Einstein High School	414
Walt Whitman High School	184
Flora M. Singer Elementary School	18
Somerset Elementary	5
MCPS-Athletics	325
All MCPS Permits	**10,629**
All Non MCPS Permits	**10,712**

The next table highlights the top ten locations for field rental for MCPS or Recreation athletic fields. Argyle Middle School (which includes eight fields) had the largest number of permitted hours in FY23.

MCPS and Recreation Athletic Fields, FY23 Permitted Hours of Use, by Top Ten Locations

Location	Hours
Argyle Middle School (8 Fields)	2,833
Walter Johnson High School (3 Fields) *	2,551
Bethesda-Chevy Chase High School (1 Field) *	2,538
Thomas S. Wootton High School (2 Fields) *	2,113
Wheaton High School (1 Field) *	2,056
Redland Middle School (4 Fields)	1,917
Richard Montgomery High School (4 Fields) *	1,916
White Oak Community Recreation Center (1 Field)	1,815
Paint Branch High School (2 Fields) *	1,749
Winston Churchill High School (5 Fields)	1,712

*Includes synthetic field.

MCPS/Recreation Fields Hours of Use, by Day/Time. OLO analyzed the data to provide a sense of when fields are being permitted. The data for hours of use for MCPS/Recreation fields show similar patterns to Parks' fields:

- Both grass and synthetic turf fields were most often booked in spring and fall months, with May and October being the most permitted months;
- Fields were booked evenly throughout the days of the work week, but show more permits on weekend days; and
- During the school/work week, fields were most often permitted for less than two hours during the typical after school/work time (5:30pm-7pm) while during weekend days, fields were most often permitted for much longer periods of time.

MCPS and Recreation Athletic Fields, FY23 Permitted Hours of Use, by Month

Month	Turf Hours	Grass Hours	All Hours
January	1,360	69	1,429
February	1,261	94	1,355
March	2,148	3,497	5,645
April	1,978	7,348	9,326
May	2,369	**8,487**	**10,856**
June	1,910	5,958	7,868
July	689	4,462	5,151
August	2,162	3,973	6,135
September	2,353	6,751	9,104
October	**2,569**	6,816	9,385
November	1,791	2,015	3,806
December	753	121	874

MCPS and Recreation Athletic Fields, FY23 Permitted Hours of Use, by Day of Week

Day of Week	Turf Hours	Grass Hours	All Hours
Sunday	3,441	7,419	10,860
Monday	2,564	6,150	8,714
Tuesday	3,013	7,055	10,068
Wednesday	3,081	6,954	10,035
Thursday	3,165	6,922	10,087
Friday	2,257	6,038	8,295
Saturday	**3,821**	**9,051**	**12,872**

The data in the next table show the two most commonly permitted time periods each day of the week. It should be noted that OLO did not include days in which County Government blocks off entire days on fields (will do this on fields near schools, for maintenance purposes, etc.).

MCPS and Recreation Athletic Fields, FY23 Most Permitted Time Range, by Time of Day and Day of Week

	All	Grass	Synthetic
Sunday	9:00 am - 12:30 pm	12:30 pm – 8:00 pm	9:00 am - 8:00 pm
	12:30 pm - 8:00 pm	9:00 am - 12:30 pm	10:30 am - 4:30 pm
Monday	6:00 pm - 8:00 pm	6:00 pm – 8:00 pm	7:00 pm - 9:00 pm
	5:30 pm - 7:30 pm	5:30 pm - 7:30 pm	5:00 pm - 8:00 pm
Tuesday	5:30 pm - 7:30 pm	5:30 pm - 7:30 pm	7:00 pm - 9:30 pm
	5:30 pm - 7:00 pm	5:30 pm - 7:00 pm	8:00 pm - 10:00 pm
Wednesday	5:30 pm - 7:30 pm	5:30 pm - 7:00 pm	7:00 pm – 9:00 pm
	5:30 pm - 7:00 pm	5:30 pm - 7:30 pm	5:30 pm - 8:30 pm
Thursday	5:30 pm - 7:30 pm	5:30 pm - 7:00 pm	5:30 pm - 8:30 pm
	5:30 pm - 7:00 pm	5:30 pm - 7:30 pm	8:00 pm - 10:00 pm
Friday	6:00 pm - 8:00 pm	4:00 pm – 5:00 pm	5:30 pm - 8:30 pm
	4:00 pm – 5:00 pm	6:00 pm - 8:00 pm	5:00 pm – 8:00 pm
Saturday	9:00 am - 12:30 pm	9:00 am - 12:30 pm	2:00 pm - 8:00 pm
	9:00 am - 12:00 pm	9:00 am - 12:00 pm	2:00 pm - 8:30 pm

MCPS Field Use by Type of Grass and Drainage. For fields permitted by CUPF, OLO was able to identify the following fields that are Bermuda grass (identified by MCPS and Parks): White Oak Recreation Center, Kemp Mill Elementary School, Highland Elementary School, Montgomery Blair HS' Track Field, Montgomery Blair HS' practice field, Quince Orchard HS' practice field, Winston Churchill HS' practice field. In addition, all high school stadium fields that are natural grass use Bermuda grass. The following shows the differences in hours of use for fields with Bermuda grass compared with tall fescue. It is important to note that MCPS does not permit out its stadium natural grass fields very often to maintain the quality of the field for athletic games.

- There were 234 fields with tall fescue grass with a total of 47,234 hours of use for an average of 202 hours per field; and
- There were 14 fields with Bermuda grass with a total of 3,659 hours of total use for an average of 261 hours per field.

Concerning drainage on athletic fields, MCPS staff report that they do not track data with regards to drainage.

MCPS/Recreation Fields Use by Recreation. As discussed in the previous chapter, the Department of Recreation can reserve field space from both CUPF and Parks before permitting is open to the general public. Recreation provided OLO with data on which fields were permitted to them for internal programming during Fall 2023/Spring 2024 (OLO excluded baseball/softball programming). These data do not provide a full picture of Recreation use of these fields but does provide a sense of typical Recreation use of the fields (CUPF permitted fields) for the season.

- ***MCPS Fields***. Data Recreation shared with OLO showed the Department had nine permits issued for MCPS athletic fields during Fall 2023/Spring 2024 across five locations. These permits were for weekly programming (all on Saturday or Sunday) for seven to twelve weeks. The hours permitted ranged from 3-½ to 10 hours per day.

- ***Recreation Fields***. Data Recreation shared with OLO showed the Department had 24 permits issued by CUPF for Recreation athletic fields during Fall 2023/Spring 2024 across six locations. These permits were for weekly or twice weekly programming (throughout the week) for two to eleven weeks. The hours permitted ranged from one to ten hours per day.

C. Maintenance Costs and Hours for Athletic Fields in the County

This section provides an overview of data provided by MCPS, Parks, and Recreation on the costs and hours associated with the maintenance of rectangular athletic fields. Note the following are estimates of hours and costs – both MCPS and Parks do not have a line–item budget by field so actual costs for these data points are not available. Specifically, MCPS' maintenance budget for fields is part of a school's overall maintenance or athletic budget and costs for specific fields cannot be identified. Similarly, Parks can provide data on hours and costs associated with a specific park, but not for specific fields because as there are often multiple fields and other green spaces in a single park. Therefore, OLO asked for summary estimates of hours and costs of maintenance for rectangular athletic fields.

MCPS Athletic Field Maintenance Costs and Hours. This section provides an overview of MCPS provided data on the cost and maintenance hours of their high school stadium and practice fields. As discussed earlier, most maintenance at the middle and elementary school level is completed by Parks and is not included in these data.

Athletic Field Costs. The data in the following table summarize the estimated annual costs of maintenance on high school athletic fields. As shown, maintenance costs for stadium natural grass fields (Bermuda grass) are $10,000-$20,000 high compared to practices field costs and almost five times as much compared to synthetic turf field costs.

Estimated Costs of MCPS Field Maintenance

Type of Field	Includes	Estimated Annual Cost Per Field
Practice Field		
Non-Bermuda Grass	Maintenance, mowing and lining	$35,000-$40,000
Stadium Field		
Bermuda Grass	Maintenance, mowing and lining	$50,000-$55,000
Synthetic Turf	Maintenance and grooming visits, GMAX testing 2x/year	$12,000

OLO also asked MPCS for cost estimates on the installation of new fields - MCPS reported they do not have current estimates due to inflation and increased construction costs. Costs in prior years were approximately $600,000 for a natural grass field installation and $1.2 million for a synthetic turf field installation (with drainage and site-specific costs varying widely).

However, MCPS is consulting with Soccerplex on updated cost numbers and the latest standards for grass fields. Based on preliminary information, MCPS estimates the cost for a natural grass field installation with appropriate drainage and soil will be closer to $1 million. The current costs for the replacement cost of a synthetic turf field is approximately $700,000, including installation of a new shock pad due to the transition from crumb rubber to organic infill. A newer cost estimate for installing a new synthetic turf field is likely to be higher now as well but is highly dependent on location.

Athletic Fields Hours of Maintenance. MCPS staff report they spend an average of about 250 hours of maintenance annually per field (including baseball, softball and stadium fields with natural grass).

Parks Athletic Fields Maintenance Costs and Hours. Similar to MCPS, Parks does not budget for maintenance by specific field. **Therefore, Parks provided OLO with its OBI, which is a document that outlines the assumed maintenance costs and hours associated with various types of fields. The data shared is meant to be looked at as a general magnitude of labor associated with each type of field, rather than actual labor hours and costs of maintenance.** OLO notes the following caveats for this dataset:

- Estimates for the hours of labor associated with maintenance were not available for each maintenance activity (I.e., aeration, weed control, etc.); and
- There are a different number of weeks associated with maintenance activities. For example, grass fields are generally maintained in Spring – Fall while maintenance for synthetic fields is conducted year-round.

Similar to MCPS data, these data show that Bermuda grass athletic fields require both the most hours and highest costs for annual maintenance.

Annual Labor Hours and Costs for Parks Fields, OBI Estimates

	Total Hours Labor	Labor Costs Per Field	Non-Labor Costs Per Field	Total Costs Per Field
Non-Bermuda Grass				
Local Park	201	$6,909	$14,726	$21,635
Regional/Recreational Park	272	$10,190	$16,439	$26,629
Bermuda Grass				
Local Park	291	$9,074	$17,726	$26,800
Regional/Recreational Park	374	$18,348	$19,439	$37,787
Synthetic				
Regional/Recreational Park	335	$9,929	$23,300	$33,229

Parks also provided OLO with cost estimates for the installation of new fields and replacement costs. For natural grass fields, Parks provided OLO with two cost estimates – one for a lower-end field and one for a higher-end field. The level of installation and infrastructure differs greatly:

- Installation for the lower-end natural grass field at Strathmore Local Park (which is currently being constructed) cost $261,902. Installation costs include importing topsoil, grading, sod and goals.
- Installation for the higher-end natural grass field at Hillandale Local Park cost $888,174. Installation costs include under drainage, irrigation, high sand engineered soil, sod and goals.

Estimates for synthetic turf fields were provided to Parks by a Hellas representative, a synthetic turf supplier. The cost of a new field is estimated to cost between $1.1 to $1.2 million. Cost for carpet replacement for an existing synthetic turf field is between $600,000 to $700,000.

Recreation Athletic Fields Maintenance Costs. Maintenance on Recreation fields is completed by multiple departments. Two of Recreation's field locations (Germantown and White Oak) are maintained by the Parks Department. The other locations receive minimal maintenance - the Department of General Services mows these fields twice a month. During peak growing season (April - end of October), Recreation pays for an additional two mows per month. Recreation staff estimate the cost of these additional mows was approximately $1,670 per month for all sites.[265]

[265] Includes mowing at Bauer Drive Recreation Center in addition to the permittable fields identified. The field at Bauer is not a full field (and is not permittable) but it has significant drop-in play and use by Recreation programs, so it is mowed by the Department.

Recreation also has a contractor for the maintenance of their one synthetic turf field at North Potomac Recreation Center. The contract is not to exceed $24,105 per year and covers up to nine maintenance visits per year (one of which includes specialized annual testing). See maintenance section above to see specifics of synthetic turf maintenance.

Chapter 8. Stakeholder Observation

For this report, OLO conducted interviews with a wide variety of athletic field stakeholders, including:

- County Government employees;
- Parks Department employees;
- MCPS staff, students and parents;
- Athletes and sports organizations;
- Experts in sports field management;
- Academics aligned with research associated with turf management;
- County employees of neighboring jurisdictions; and
- Employees in both the synthetic turf and natural grass industries.

For a full list of those OLO spoke with, please see Acknowledgements Section in Chapter 1. These interviews were designed to gain stakeholders' observations regarding their experiences with synthetic turf and natural grass sports fields. OLO has summarized feedback into themes heard across stakeholder interviews and feedback that reflects the perspectives of those interviewed, which may not necessarily reflect the opinions or experiences of all County field users.

It should be noted that OLO spoke with both the Department of Environmental Protection (DEP) and the Department of Health and Human Services (DHHS). Both departments reported that they have not taken a position on the use of natural grass and synthetic turf athletic fields in the County.

General Observations on Natural Grass

Stakeholder observations on the pros and cons of natural grass differed. Overall, most stakeholders agreed that in a perfect world, natural grass fields are ideal. However, maintaining natural grass fields to a high quality (one that is safe and has a consistent, even surface) at all times, is extremely difficult in this area. Reasons cited for the difficulty of maintaining all natural grass fields to a high quality include:

- Almost all athletic fields in the County are natural grass fields and do not provide the hours of use needed by field users in the County. There are not adequate resources provided to maintain existing natural grass fields at a high and safe level;
- Maryland is in a transition climate where it is difficult to grow natural grass, especially to the level required for a high-quality athletic field; and
- Some areas of the County, especially the eastern part of the County, do not have the space for multiple grass fields, which would be required to allow for adequate alternating/resting of fields to maintain grass.

OLO heard that another major roadblock to maintaining high-quality natural grass fields in the County is the need to limit usage and keep people off fields to allow for recovery, while some stakeholders find this problematic and believe public fields should encourage walk-on play outside of league use because parks are a public good.

Some stakeholders also asserted natural grass fields' benefits outweigh their drawbacks, stating that natural grass fields are better for the environment and new innovations in grass varieties can increase a field's hours of use. Some benefits of natural grass mentioned include:

- Natural grass is much cooler than synthetic turf;
- Natural grass can provide stormwater management – it can both slow water runoff and filter stormwater, removing pollutants before it reaches groundwater sources;
- Natural grass can sequester carbon and enhances biodiversity in the area; and
- Natural grass provides a more attractive surface for recreating on - "people don't want to lie or sit down on plastic, but they do on grass."

General Observations on Synthetic Turf

Many of the coaches, athletes and sports organizations OLO spoke with said the athletes like the predictability and consistent surfaces of a turf field for play. However, some stakeholders mentioned they see incidences of "turf burn" and more heat-related illnesses when playing on synthetic surfaces.

Stakeholders also mentioned they like that practices and games rarely get cancelled on synthetic turf fields – typically they are only cancelled if there's lightning or the ground is frozen. For youth sports especially, kids want to play and are disappointed when practices are cancelled (and parents get irritated), which happens often due to rain. Other stakeholders in youth sports shared that their kids believe good synthetic fields transform the quality of play because the surface is more predictable than poorly kept grass fields, increasing their enjoyment of the game.

Some stakeholders mentioned conflicting research on synthetic turf and could not say for sure if it is safe or not. Others mentioned that most research on synthetic turf is based on crumb rubber fields (which the County is eliminating) so they were less concerned. Overall, stakeholders who are in favor of synthetic turf fields shared the sentiment that any potential health and environmental drawbacks are outweighed by the health and social benefits of more people being able to play sports. Some stakeholders elaborated and cited that the physical and mental health benefits of regular exercise and playing together as a team outweighed health concerns about synthetic turf.

Other observations OLO collected about synthetic turf includes:

- While synthetic turf fields require less maintenance than natural grass fields, they are not maintenance free.
- Different sports have different needs, and some sports play better on synthetic turf, such as field hockey.
- Synthetic turf fields are preferable in the County because many natural grass fields in the County are not consistently maintained.
- Some stakeholders believe synthetic turf fields in the County are not maintained properly and have GMAX levels that are much higher than industry recommendations (165). This is a huge concern for safety.[266]

Environmental and Health Impacts of Synthetic Turf

Stakeholders shared many observations with OLO regarding environmental and health impacts of synthetic turf. Multiple stakeholders who are against use of synthetic turf fields noted that while research on environmental and health impacts of synthetic turf are inconclusive, the "absence of proof of harm does not mean absence of harm." Some stakeholders also asserted that synthetic turf is plastic and comes with all the environmental and health impacts of plastic products. One stakeholder further elaborated, explaining organic infill does not make much of a difference because the rest of the field is plastic and is ultimately bad for the environment.

Two of the biggest concerns brought up by stakeholders were the disposal of synthetic turf and microplastics. For disposal, when synthetic turf reaches its end of life, it is not transparent where field components end up, whether portions are recycled, or if it all goes to a landfill. Stakeholders cited synthetic turf companies are not forthcoming with information on the final location of old synthetic turf fields. Stakeholders are also concerned that if synthetic turf is not recycled, it will contribute greatly to waste because fields must be replaced every 8-10 years.

Regarding microplastics, stakeholders cited a European Union (EU) Study which found synthetic turf, specifically with rubber infill and plastic grass blades, was the largest single source of plastic pollution in waterways. Stakeholders mentioned this spurred the EU's decision to ban crumb rubber infill. Several stakeholders also cited legislation, both recently passed or introduced, that either bans or limits use of synthetic turf due to microplastics and/or chemicals of concern in synthetic turf, especially PFAs.

[266] MCPS reports that with organic infill and current shockpad systems being utilized on all stadium fields, current GMAX levels are significantly lower than the threshold for safety. The maintenance logs, which report GMAX levels for all synthetic turf fields, are available here.

Other observations about the environmental and health impacts include:

- As synthetic turf is an impervious surface, stormwater runoff can be a significant issue;
- Synthetic turf fields get much hotter than natural grass fields. This is dangerous for field users, especially young children who are lower to the ground, where surface levels of the synthetic turf are higher; and
- PFAs have been found in synthetic turf fields and as more regulations about PFAs emerge, synthetic turf usage should be limited.

MCPS Student Climate Action Plan – White Paper on Benefits and Drawbacks of Synthetic Turf

OLO met with the MCPS Student Climate Action Council, comprised of 14 students across MCPS who work to support and hold MCPS accountable for their climate goals – cutting greenhouse gas emissions by 80% by 2027 and 100% by 2035 (compared to 2005 MCPS emission levels). The Council authored a white paper on the benefits and drawbacks of synthetic turf and natural grass athletic fields. Overall, they found synthetic turf allows for use in most weather conditions, increasing hours of use available for field users and has less maintenance requirements compared to high-quality grass athletic fields. However, they found several environmental and health related drawbacks to synthetic turf including:

- When it reaches the end of its life it is often disposed of in landfills, contributing to waste;
- Chemicals used to manufacture synthetic turf includes PFAs, which can contaminate local waters and pose health risks to the community;
- Synthetic turf contributes to the heat island effect due to the high surface and ambient temperatures it can reach, which can also lead to heat-related illnesses; and
- Injuries can occur when synthetic turf is not maintained properly and allowed to reach an unsafe level of hardness.

For natural grass fields, the report finds the main concern is consistent playability. However, the Student Climate Action Council concluded that synthetic fields pose a risk to the safety of students and the environment. They concluded MCPS should take steps to provide students and the community with high- quality natural grass fields.

New Innovations in Athletic Fields

Stakeholders cited multiple recent innovations in both synthetic turf and natural grass athletic fields:

- New varieties of grasses are more wear, disease and drought tolerant. Most stakeholders interviewed who were proponents of natural grass fields asserted that natural grass can be as playable and reach equivalent hours of use as synthetic turf fields and do not believe the County has invested fully in the capabilities of natural grass.

- Hybrid fields are an emerging technology mentioned by multiple stakeholders. They combine elements from natural grass and synthetic turf – either by stitching synthetic fibers into natural turf or laying a synthetic grass carpet on top of natural grass. However, these stakeholders note the technology is very new and expensive, but most expressed cautious optimism about these new fields.
- There are new, albeit unproven, types of synthetic turf that address heat issues. One such infill mentioned was GeoCoolTM, which is supposed to reduce surface temperature through slow evaporative cooling.
- Fourth generation synthetic turf fields without infill is an emerging technology, which if more widely adopted, will reduce microplastic pollution from synthetic turf.
- Recycling technologies for synthetic turf seem to be improving; however it is difficult to know whether recycling of synthetic turf is actually occurring.

Equity

OLO received feedback about equity and athletic fields - most of this feedback asserted that access to both types of fields is not equitable in the County. For example, high schools with natural grass fields almost always must hold team practices off campus requiring students to find transportation to off campus sites and limiting accessibility for all students. Other access/equity issues for students and student athletes cited were:

- Schools without access to synthetic turf fields get practices cancelled more often due to rain than schools with access to synthetic turf fields;
- Natural grass fields do not always have needed lines for a sport painted on them while synthetic turf fields do.
- Parks will not allow football on certain natural grass fields, limiting where football teams can practice[267];
- High schools do not allow team practices on stadium fields with grass, decreasing the amount of available practice space;
- For schools with all or mostly grass fields, PE and breaks are often held inside rather than outside to limit use and protect the health of fields. Schools with synthetic turf, on the other hand, can use them all day for programming – including lunch, recreation, PE, after school sports; and
- Schools with less field space often must share fields among multiple teams, with practicing often occurring in the outfields of baseball and softball fields, causing more wear and tear on these fields.

[267] Upon review of the report, Parks informed OLO that this statement is not true and Parks will permit football on any open rectangle if the time is available.

Further, regarding County-based sports leagues, OLO heard that many surrounding counties have more synthetic turf fields available compared to Montgomery County (both for practices and games). This is perceived as inequitable because teams with regular access to synthetic turf for practice and play have an advantage. Further, many games, especially field hockey, feel and play very different on synthetic turf versus natural grass and puts athletes who mostly play on natural grass at a competitive disadvantage. Further, OLO was informed the State of Maryland requires high school sports playoff games to be played on synthetic turf and school teams are required to play a certain number of games to qualify for state playoffs and if too many games on natural grass fields are cancelled due to weather, teams cannot meet that requirement and cannot participate in playoffs.

MCPS Specific Observations

MCPS supports use of synthetic turf fields for numerous reasons:

- They provide a greater degree of equity between schools;
- Synthetic turf fields are high-quality, professional level playing fields;
- More high-quality on-campus practice fields decreases the need for school sports teams to use off-campus fields;
- They allow safe, year-round use under most weather conditions; and
- They provide enhanced opportunities for use by community groups and school teams.

OLO heard from MCPS representatives that the primary issue for MCPS during sports seasons is the number of teams that need to play. Schools without enough field space for their teams must coordinate off campus practices, which comes with its own host of issues (bus scheduling, students driving themselves, time spent commuting). Ultimately, MCPS's goal is to keep kids playing sports on campus, but that requires more usable fields on campus. Other issues reported are:

- Some County fields lack painted lining on grass fields for specific sports, which impacts practice and can put athletes at a competitive disadvantage if their opponents practice on lined fields;
- Spring season for MCPS sports starts March 1; however, Parks' fields do not open until March 15th, and MCPS has difficulty finding enough available fields to use during that period;
- Rescheduling games and practices can result in trainers not being able to attend and be on site, which may present Title-IX issues;
- When schools rent fields through CUPF and Parks, the funds come from the schools' budgets. If schools have available fields on campus, the funds could be used for other sports programming; and
- When fields are closed due to rain, it can be difficult to accommodate all teams that need to practice, and some practices are moved inside, which decreases the quality of practice.

Leagues and Athletes Specific Observations

The primary concern among most sports organizations and athletes who spoke to OLO is being able to play. Stakeholders cited issues with needing to reschedule games and practices due to rain cancellations, which can be extremely difficult. They also noted the quality of natural grass fields in the County are often not up to competitive levels, with visible wear patterns, divots, and holes in many fields, especially in high traffic areas (middle of the field and near goal mouths).

Another issue stakeholders brought up repeatedly is that neighboring jurisdictions have better fields and facilities, in part because they have many more synthetic turf fields. Stakeholders in sports organizations expressed concerns that County athletes are deciding to play in leagues in other counties to play on synthetic turf fields located in these counties (decreasing missed practices and games due to rain cancellations) and remain competitive with other athletes in the region.

Maintenance of Athletic Fields in Montgomery County

OLO heard from a wide variety of stakeholders that the limited resources in the County do not allow MCPS, Parks, or Recreation to maintain the large number of natural grass fields at optimal levels for safe playability. Many stakeholders asserted Montgomery Parks does the best it can with limited resources; however, with more staff and specialized equipment, field standards could be raised.

Stakeholders also noted maintenance across Parks and MCPS fields is not consistent. Some fields receive higher levels of maintenance while other fields become unplayable quickly after high usage. Specific issues cited about grass fields in the County include:

- Many fields are extremely hard due to soil compaction (specifically, our native soil has a high clay content, which makes the field harder);
- Some fields are more dirt than grass;
- Some fields are not kept mowed low enough for competitive play;
- A significant number of fields have poor drainage and will remain flooded long after rain stops;
- Irrigation and lack of drainage is a huge issue on many County fields. Many fields were not originally built properly and renovations would be costly – both in time and money;
- There is not an enforcement arm large enough to deter people from playing on fields that are closed due to rain. Playing on wet fields inflicts major damage, making it even more difficult to maintain good grass fields;
- Pesticide limitations at the State level make it difficult to have high-quality grass fields; and

- The only downtime for grass fields in the County is in the winter, but County winters do not provide the proper conditions for regrowing grasses, resulting in unhealthy fields in the spring season.

County employees told OLO there is a balancing act to distribute available funding for all fields in the County. Staff have to balance spending more funds on one field in a central location that gets a lot of usage with spreading funding among more fields with less intensive maintenance requirements.

OLO also heard many general observations about maintenance for both types of fields – some conflicting. Some stakeholders said maintenance for good grass fields is much higher than synthetic turf while others said they both required about the same level of maintenance (varying opinion were from all types of stakeholders, including synthetic turf organizations and natural turfgrass organizations). Some specific feedback included:

- Organic turf infill has extra maintenance issues because it breaks down much quicker than crumb rubber infill, gets blown away or pushed around during heavy rains, and may require extra watering to maintain moisture levels. Some stakeholders even reported weeds growing in some plant-based infill, which requires weed removal by hand.
- Heavy rains delay maintenance – especially for natural grass fields. Crews cannot mow during a rainstorm which results in rescheduling services – sometimes up to a week.
- Making high-quality natural grass fields take a good bit of renovation and maintenance, is very technical, and requires specialized expertise.
- Many people in the natural grass industry say grass fields can withstand more use than typically assumed, especially with proper maintenance. Many stakeholders mentioned aeration as an extremely important maintenance practice that could increase hours of use.
- OLO heard conflicting information about the maintenance costs of each type of field – some stakeholders said maintenance costs are about the same for a high-quality synthetic and high-quality natural grass field, others said maintaining high-quality grass fields are much more expensive than maintaining high-quality synthetic fields.

Field Usage and Ease of Reserving

OLO asked stakeholders about how well the current number of fields in the County serves the community. Almost all County stakeholders agreed there are not enough fields in the County to meet demand. Specifically, OLO heard the following:

- The demand for fields in more popular areas in the County (generally denser areas) is higher than what is available.

- It is difficult to find a quality field because there is not enough inventory.
- It is impossible to book a high school synthetic turf field.
- Historical use and the reservation process for Parks and MCPS fields makes it difficult for smaller and/or newer organizations to reserve fields and makes it difficult for existing leagues to expand.
- Some stakeholders believe certain organizations have more power in permitting fields, describing a political aspect in bookings. Groups that have reserved fields and facilities in the past get access to reservations before other users.
- Residents who live in the community find it difficult to access fields in their area. Big user groups often take up the majority of reservation slots. Leagues note they need the fields and would not be able to meet their member's needs to expand leagues if they lost access.
- The higher price of renting synthetic turf fields impacts smaller organizations that have fewer resources.
- A lack of fields means losing kids to sports organizations in other counties. Stakeholders report some County residents enroll in sports leagues in neighboring counties in order to have more opportunities to play on fields better suited for their sport.
- Stakeholders want more permittable fields with lights to increase the hours of use and allow more leagues and users to access fields.

Hours of Use

OLO heard differing opinions on hours of use a field can withstand. Those in the natural grass industry assert that natural grass fields can take a lot more usage than most people think, and maintenance hours and costs are not much more than for synthetic turf fields. Other stakeholders OLO spoke to disagreed. Both sides agreed the hours of play associated with either type of field is highly based on the quality of installation and maintenance of fields. If fields, regardless of type, are built correctly with proper drainage and maintenance performed following best practices, hours of use can be increased.

Cancellations

OLO heard from many stakeholders that cancellations (usually due to rain) are a huge problem on natural grass fields for MCPS and sport organizations. While rainout cancellations are necessary to maintain the quality of the fields, those decisions often cause tension between Parks (which is responsible for decisions to close fields for rain) and MCPS schools needing practice time for athletes. Further, leagues schedule for a set number of potential rainouts and parents and athletes often get

upset when practices/games cannot be made up. Overall, OLO heard from multiple sources that athletes just want to play and not have games constantly cancelled.

Health/Injury Impacts

When asked about perceptions on injuries on synthetic turf compared to natural grass fields, most stakeholders either said they saw no difference or that too many factors are associated with injuries to determine whether one is better or worse than the other. However, some stakeholders mentioned they see incidences of "turf burn" and more heat-related illnesses when playing on synthetic surfaces. Others mentioned they have seen more injuries on grass fields that are not maintained well, such as ankle injuries from tripping over divots and holes in grass fields. Stakeholders assert that the inconsistency of natural grass can lead to injuries – particularly non-contact injuries.

Other stakeholders mentioned research by experts showing increased injuries on synthetic turf but were unsure about how the research relates to youth sports because most research is on professional or high-level of play (e.g., college athletics). Overall, many stakeholders expressed all surfaces are unsafe if they are not properly maintained.

Recommendations

Some stakeholders made recommendations on how the County should proceed with natural grass and synthetic turf fields:

- Multiple stakeholders cited Soccerplex as the experts of natural grass management and suggested the County review Soccerplex's management practices for natural grass;
- The University of Maryland has a robust natural grass research program. The County could develop a partnership with the university to improve County grass fields; and
- Building more synthetic turf fields in the County could generate significant revenue and could encourage sports tourism. MCPS and Parks should partner more with sports organizations to increase the amount of funds available for installing more fields, both synthetic and natural grass, and increase standards of maintenance for new and existing fields.

Other Local Jurisdictions

OLO also looked to other neighboring jurisdictions to gather information on synthetic and natural grass fields.

Howard County. In Howard County, all stadium fields at high schools are synthetic while most practice fields are a blend of Kentucky Blue Grass and Tall Fescue. Staff informed OLO that from a municipality standpoint, it makes sense to have some synthetic turf fields while keeping a place for natural grass fields. Schools use fields at a high rate and it is important to provide safe fields with consistent footing. To do so, Howard County and Howard Schools have an agreement to rent school fields through their Parks department, who receives revenue and uses this revenue to help replace county fields.

Fairfax County. Currently, there are over 100 synthetic turf rectangular athletic fields in Fairfax County – at schools and in public parks. A County Task Force determined converting to synthetic surfaces allowed for year-round play and increases hours of playable time which helps address field availability shortages and increased equity throughout the county. The Task Force also developed plans to both equitably distribute the geographic location of fields and the scheduling of fields – to ensure all residents could play on fields.

Prince George's County. In 2021, the Prince George's County Board of Education released a Climate Action Plan which recommended transitioning athletic fields to natural turf for improved climate resilience. However, three high schools in Prince George's County are in the process of installing synthetic turf fields. Some school officials state current grass fields are too "dangerous and muddy" and see synthetic turf fields as an upgrade.

Anne Arundel County. Currently, every high school in Anne Arundel County has at least one synthetic turf field and according to the FY2024 Comprehensive Maintenance Plan for Anne Arundel County Public Schools, all high schools will have two artificial turf fields by FY2025. These field are under an agreement with the Department of Recreation and Parks to allow the field to be used for public activities, when not in use by school activities.

Sources (along with feedback): Prince George's County Public Schools, "Climate Change Action Plan", 04/2022.; WTOP News, "3 Prince George's Co. high schools in line for turf fields, but when will they be built?", 5/18/2024.; Fairfax County, VA, "Synthetic Turf Fields", Accessed 4/21/2024.; Fairfax County, VA, "Synthetic Turf Task Force: Overview, Findings, and Recommendations", 07/2013.; Anne Arundel County Public Schools, "FY 2024 Comprehensive Maintenance Plan", Accessed 6/14/2024.; Anne Arundel County, "Facility Scheduling", Accessed 6/15/2024.; Capital Gazette, "Athletic facilities at county high schools a mix of new and upcoming projects", 9/3/2017.

Chapter 9. OLO Findings and Discussion Items

Athletic fields provide a community with opportunities to participate in active recreation, a space to socialize with friends and family, and to connect with nature. As a result, access to public open space is often in high demand in many areas, including Montgomery County. The decision to use natural grass or synthetic turf is driven by a complex range of factors, including local conditions, community needs, maintenance capabilities, budget and conflicting views that often exist between and among local authorities, user groups, and the wider community. For this report, OLO aimed to provide a comprehensive overview of the advantages and disadvantages of each playing surface and data on public athletic fields in the County. This chapter provides an overview of OLO's findings and discussion issues for Council consideration.

OLO Findings

Overview of Synthetic Turf and Natural Grass Playing Fields

Finding #1. Numerous competing factors are involved in decisions to choose natural grass or synthetic turf for an athletic field. Considerations specific to individual fields may recommend use of natural grass in some instances and use of synthetic turf in others.

A natural grass athletic field is a playing surface comprised of living turf grasses. Construction and maintenance of natural grass athletic fields require specialized expertise to ensure optimal playability and safety for players. A synthetic turf athletic field is made of synthetic fibers that mimic natural grass. Specifically, synthetic turf is composed of three primary layers: 1) a layer of synthetic grass fibers generally made out of plastic connected to a backing material; 2) filler granules, known as infill material, which can be made out of organic materials like cork or synthetic materials like rubber; and 3) a support mat that allows for drainage.

Both types of fields have advantages and disadvantages - decisions about which type of field to use that involve competing factors:

- Availability for use – both on a daily basis and year-round;
- Potential environmental impacts from materials, construction, and required maintenance;
- Potential health and safety impacts to field users;
- Playability;
- Required maintenance;
- Cost; and
- Equity considerations.

Environmental Considerations

Finding #2. Environmental concerns about synthetic turf include its contribution to waste and the lack of transparency in its disposal. However, OLO found significant gaps in the research assessing the risk of synthetic turf fields and potential health effects it poses to field users and communities.

Environmental concerns associated with synthetic turf include:

- High ambient temperatures which can contribute to the urban heat island effect;
- Contribution to microplastic pollution in nearby water ways;
- Increased runoff and decreased water retention abilities due to its impervious nature, which can exacerbate flooding;
- Chemicals present in synthetic turf such as forever chemicals (PFAS) and heavy metals, especially in those with crumb rubber infill, pose a risk to the health of the environment; and
- Negative impacts on climate resilience as heat, runoff, and flooding issues will likely be exacerbated as temperatures and heavy rainfall increase due to climate change.

One of the biggest environmental impacts of synthetic turf is its contribution to waste. Synthetic turf fields and materials must be disposed of or reused at the end of their useful life (ranging from 8 – 12 years). Recycling synthetic turf fields has proven to be expensive and difficult because the materials that make up the turf are difficult to separate. Many old synthetic turf fields are at risk of ending up in landfills and synthetic turf companies are not transparent in the end-of-life destination for old fields. Overall, recycling technologies in the United States are not yet up to the task of recycling the materials from synthetic turf.

However, OLO found there are significant gaps in the research available in assessing the risk of synthetic turf field materials because of (1) a lack of comprehensive epidemiologic studies that focus specifically on the potential health effects of synthetic turf on field users and communities; and (2) a lack of research focused on various types of infill, with almost all studies focusing on tire crumb rubber infill. The most studied component of synthetic turf by both government agencies and academic researchers is use of tire crumb rubber infill and the chemicals found in crumb rubber. However, there are no large-scale epidemiological studies that assess the risk of human health impacts of chemical exposure from synthetic turf use outside of extremely limited studies focusing on cancer incidence.

Instead, studies investigate the levels of chemicals present in synthetic turf and discuss potential environmental and health impacts from chemical exposure. Many studies have found that the chemical levels found in crumb rubber are below the environmental standard of regulation and

conclude there is a low level of concern from exposure to chemicals present in synthetic fields with crumb rubber infill and there is not enough evidence to advise people against playing sports on synthetic turf.

Finding #3. Montgomery County currently has two synthetic fields with crumb rubber (out of 19 total). The fields will be replaced by organic infill at the end of their life cycle (tentatively scheduled for FY25).

In Montgomery County, a 2015 resolution was passed by the County Council, which stated the Council will approve only the use of plant-derived infill materials for newly installed synthetic turf playing fields that the County funds. Since the resolution, new fields funded by the County have been installed with plant-derived infill materials and currently, there are two fields left in the County with crumb rubber infill, located at Fairland Recreational Park and Martin Luther King Jr. Recreational Park, which are tentatively planned to be replaced in FY25.

Research shows most chemicals of concern are present within tire crumb rubber infill and these fields are associated with many of the environmental concerns of synthetic fields. However, there is emerging research on the risks associated with microplastic pollution and other chemicals of concerns that are found in synthetic fields, regardless of infill.

Finding #4. Natural grass fields provide many environmental benefits, including stormwater management. However, negative environmental impacts of maintenance requirements for natural grass fields can negate some positive environmental impacts.

Overall, positive environmental impacts of natural grass playing fields include:

- Its ability to absorb carbon in the soil;
- Its contribution to stormwater management (when built with proper drainage);
- Promotion of biodiversity; and
- Providing a cooler surface for play.

However, for optimal playability, natural grass athletic fields require intensive maintenance, including mowing multiple times a week, irrigation, and application of pesticides/inorganic fertilizers. According to a study conducted by the City of Zurich, Switzerland, the maintenance of natural grass athletic fields is generally more carbon intensive than maintenance for synthetic turf.

Finding #5. There are many strategies to mitigate harmful impacts – for both synthetic and natural grass athletic fields.

Installation and maintenance practices for both natural grass and synthetic turf athletic fields have the potential to impact the environment negatively. However, there are many strategies that can mitigate harmful impacts for both types of fields. Mitigation measures applicable to both types of fields include:

- Installing drainage and other stormwater infrastructure to decrease runoff and filter sediments from reaching groundwater and storm drain networks;
- Siting a field away from special protection areas or major waterways to alleviate sediment pollution and runoff concerns; and
- Practicing sustainable landscaping in the surrounding area of the field.

Mitigation measures for synthetic turf fields include: 1) switching to organic infill to decrease crumb rubber infill's contribution to microplastic pollution; and 2) installing fences and providing receptables for field users to dump infill collected in shoes to decrease the amount of infill leaving the field.

Mitigation measures for natural grass fields include: 1) aerating the field regularly to ensure the soil is not compacted (which can increase runoff and leach nutrients and pesticides form the soil); 2) practicing organic management when feasible; and 3) identifying the optimal amount of water needed for a field's health to decrease water consumption and overuse.

Injuries/Health

Finding #6. There is limited and inconclusive research on the health effects of synthetic turf compared to natural grass. OLO found that a significant number of recent health safety studies relied on older or non-relevant data.

Overall, OLO identified numerous studies that reported there were more injuries on synthetic turf fields but also identified a similar number of studies that found there was little difference in the rate of injuries between the types of fields. Studies also included numerous important caveats, including:

- Many studies were conducted on high-level athletes (professional, college) and assessed levels of very specific injuries;
- Most studies acknowledge injuries can be affected by many other factors including weather, shoes, level of competition, game/practice, sport, age, gender, field maintenance; and
- Most studies were conducted based on athletes playing on crumb rubber infill synthetic turf fields.

A 2022 meta-analysis conducted by the American Journal of Sports Medicine found of the 32 articles that compared overall injury rates on synthetic turf and natural grass, over half (53%) reported no difference in overall injury rates between the playing surfaces, 38% reported a higher overall injury rate on synthetic turf, and 9% reported a higher overall injury rate on natural grass.

The following table provides a very high-level overview of some of the research studies OLO identified, demonstrating the conflicting findings.

Population Studied	Findings	Source
College Athletes	Athletes experienced higher levels of PCL and ACL injuries on synthetic turf but there was no statistically significant difference in the rates of MCL, medial meniscal, or lateral meniscal injuries.	American Journal of Sports Medicine
NFL Players	Playing on synthetic turf resulted in a 16% increase in lower extremity injuries per play; there was no difference between Achilles tendon rupture rates and playing surface.	American Journal of Sports Medicine
MLS Soccer Players	There were 1.54 injuries per game on synthetic turf and 1.49 injuries per game on natural grass. There was a higher incidence of ankle injury, Achilles injury, and ankle fracture on synthetic turf and no difference in foot injury, forefoot injury, or knee injuries between the surfaces.	American Journal of Sports Medicine
Soccer Players Aged 7-12	Injury risk was increased on synthetic turf outside when compared with natural grass.	Scandinavian Journal of Medicine & Science
Professional Rugby Union Clubs	There was no difference in overall injury risk between the two playing surfaces. Natural grass surfaces showed a higher rate of concussion and chest injuries, while synthetic surfaces showed a higher rate of thigh hematoma and injury to players being tackled.	Journal of Sports Sciences
Athletes Across Several Sports	Hamstring injuries were 1.5 times higher on grass.	British Journal of Sports Medicine
Female Soccer Players	Female soccer players had a significantly higher risk of ACL injury (1.18 times) playing on synthetic turf and men had no significant difference.	Stanford University School of Medicine
High School Athletes	Athletes were 58% more likely to sustain injuries on synthetic turf than natural grass. Lower extremity, torso, and upper extremity injuries were significantly more likely to occur on synthetic turf.	Current Orthopedic Practice Journal
High School Lacrosse Players	Abrasion injuries accounted for 19% of all injuries on synthetic turf while only accounting for 0.5% of injuries that occurred on grass.	National Center for Health Research

Finding #7. The surface temperature of synthetic turf is widely acknowledged as a legitimate health concern, even though there is limited relevant data on the subject.

The two most commonly cited studies regarding surface temperature of synthetic turf fields sampled primarily fields with crumb rubber infill:

- Penn State University's Center for Sports Surface Research conducted studies comparing surface temperatures of synthetic turf fields composed of various fiber and infills and found the maximum surface temperatures during hot, sunny conditions averaged from 140°F to 170°F (2012).
- Brigham Young University found that "[t]he surface temperature of the synthetic turf was 37° F higher than asphalt and 86.5° F hotter than natural turf" (2002).

Although the limited research available is older and mostly focused on crumb rubber infill, almost all stakeholders accept that high temperatures of a synthetic turf athletic field can raise health concerns, especially for young children because they are closer to the ground and more susceptible to high surface temperatures. However, the synthetic turf industry reports that there is emerging infill technology that may result in lower surface temperatures.

MCPS is one of the few school systems that has placed limits on synthetic turf field use during extreme heat. MCPS' guidelines for playing on synthetic turf fields include:

- When outdoor temperature exceeds 80 degrees, coaches exercise caution in conducting activities on synthetic turf fields;
- When outdoor temperature exceeds 90 degrees, coaches may hold one regular morning or evening practice, before noon or after 5 PM;
- When the heat index is between 95-104 degrees between the hours of 12:00 PM to 5:00 PM, school athletic activities are restricted on synthetic turf fields to one hour with required water breaks every 20 minutes; and
- When the heat index is above 105 degrees, all outside activity, including practice or play, is stopped.

Legislation/Equity

Finding #8. There has been legislation across the nation related to synthetic turf, ranging from bans on specific infill types to more transparency in recycling of turf.

Communities across the nation have been debating the installation and use of synthetic turf in their jurisdictions. The following jurisdictions have passed legislation that addresses synthetic turf:

- Several communities across the country have banned, severely restricted, or passed moratoriums on the use of synthetic turf including Millbrae (CA), Westport (CT), Wayland (MA), Oaks Bluff (MA), Littleton (MA) and Concord, (MA).
- In 2017, the District of Columbia placed a moratorium on the installation or construction of any synthetic turf fields made from crumb rubber or other materials made from recycled tires on property owned or leased by the District.
- California passed legislation (2023) that allows local governments to ban synthetic grass for residential property; New York (2023) passed a bill that prohibits the sale and installation of synthetic turf that contains PFAS (sometimes referred to as forever chemicals), effective at the end of 2026; and Vermont (2024) passed a bill that prohibits the sale and installation of synthetic turf fields containing PFAS, effective in 2028.

In Maryland:

- In 2015, the Montgomery County Council adopted a resolution requiring use of plant-derived materials for infill in synthetic turf fields funded by the County.

- In 2024, the Maryland legislature passed two bills: 1) a bill that requires producers and sellers of synthetic turf to disclose typical maintenance practices and costs for removing, replacing, and disposing of synthetic turf. It also requires the Maryland Department of the Environment (MDE) to conduct a study on synthetic turf, existing synthetic turf fields in the state, and the synthetic turf industry in the state; and 2) a bill that prohibits selling and installing playground surfacing materials that contain: (a) more than 90 parts per million of lead; (b) fluorinated organic chemicals which includes PFAS chemicals; and (c) more than 20 milligrams per kilogram of PAH.

Finding #9. Different groups reach different conclusions when discussing equity issues related to use of natural grass versus synthetic turf playing fields. There is limited information in literature discussing social equity issues related to natural grass and synthetic turf.

Stakeholders debate equity issues surrounding the use of synthetic turf fields compared to natural grass athletic fields. Some organizations/jurisdictions assert that use of synthetic turf fields will increase social equity while others believe it will decrease equity:

- Toronto Public Health Department determined synthetic turf fields have the potential to enhance health equity by providing opportunities for outdoor recreation within low-income, high-density neighborhoods and can provide playing surfaces that can be used by persons with mobility aids (2015).
- During a debate, at Wilbur Cross High School in New Haven, CT, students and parents reported that while they would love to play on a natural grass field, the current fields were unsafe for play. They reported their field was a disadvantage — a fundamental inequity that hurts students – and requested the installation of a synthetic turf field (2022).
- Mystic Valley (MA) NAACP released a statement about the conversion of a park into a synthetic turf field concluding that the project: 1) would remove the only living green space enjoyed by the lowest income earners; 2) would create a "pay to play" scheme in the community; and 3) would increase the heat island effect and flooding of the neighborhood (2022).
- City of Malden, MA activists asked city officials to halt plans for the installation of synthetic turf over public green space after officials reported there were no synthetic turf fields planned for more affluent neighborhoods (2022).

One Fairfax. Sports participation in Fairfax County, VA has been steadily increasing and officials determined that the current inventory of athletic fields was insufficient to meet increasing demand. In 2013, a Fairfax County Task Force determined that the conversion to synthetic turf surfaces permits year-round play and allows for more equitable use between school and community groups in all geographic areas. The Task Force recommended each high school should receive two synthetic turf fields with lights and the County should look for community partnership opportunities to expand synthetic turf field development, maintenance and replacement. This was all part of the One Fairfax initiative, under which Fairfax County stated the County will provide "*[a] parks and recreation system that is equitable and inclusive by providing quality facilities, programs, and services to all communities; balancing the distribution of parks, programs and facilities; and providing accessible and affordable facilities and programs."* Fairfax County currently has over 100 synthetic turf fields.

MCPS. In addition to the equity discussions identified above, Montgomery County Public Schools representatives believe representatives believe the construction of synthetic turf athletic fields at high schools leads to a more equitable use of fields. MCPS cites the following equity issues: (1) grass fields result in limited availability and often, as a result, ensuring gender and sport equity is extremely challenging; (2) when use of grass fields has to be limited, players may have to travel to alternate playing fields, which is more difficult for populations who have transportation challenges and concerns; (3) athletes who practice on a different surface than a game is played on may be at a disadvantage; (4) schools with artificial turf have a competitive advantage, as they can practice and play games during inclement weather, when grass fields are closed; (5) schools with artificial turf have more time available for youth and community games, providing a stronger pipeline of participation; (6) schools with artificial turf have an additional teaching space for physical education, allowing for a more consistent surface and relieving use of grass practice fields; and (7) all county and state championship games must be played on synthetic turf so those schools with grass may be at a disadvantage.

Best Practices

Finding #10. The construction and level of maintenance of synthetic turf and natural grass athletic fields directly affect the safety, playability, and available hours of use of the field.

Both synthetic and natural grass athletic fields require regular maintenance to ensure optimal playability for users.

Natural Grass. Best practices differ based on the climate, variety of grass and usage. Natural grass athletic fields require specific building considerations and more intense management compared to other grassy areas. Construction for natural grass fields includes consideration of base grading to ensure a level base, adequate water runoff, subsurface drainage, irrigation, grass and material selection and grass establishment. Optimal maintenance of natural grass fields includes:

- Mowing;
- Nutrient management;
- Irrigation;
- Cultivation and surface management; and
- Disease and pest control.

Significant use and traffic on natural grass fields causes soil compaction and can lead to an inconsistent surface with divots and bare patches, which can contribute to injuries. Natural grass fields also need time to recover following use. However, due to demand, many communities schedule more events than a natural grass field can tolerate, harming the health of fields. Strategies to prolong the life of natural grass fields include:

- Rotating sports and activities between multiple fields;
- Limiting the use of fields to only necessary events, especially during periods of rainy weather;
- Changing the location of practices on the field daily to reduce wear on high traffic areas;
- Using portable goals mouth that can be moved around the field to limit wear near goals;
- Conducting warm-ups and drills off the field and outside of painted numbers;
- Spreading seed of fast germinating grass species in wear areas before games and practices; and
- Closing fields periodically for maintenance during the winter season so that dormant grasses are not injured by heavy traffic.

Synthetic Turf. There are misconceptions that synthetic turf athletic fields are maintenance-free. Synthetic turf requires regular maintenance for the longevity of a field's useful life, safety and playability, although generally, it takes significantly less time and money compared to natural grass fields. Considerations in building a synthetic turf field include site grading, placement of foundational and structural layers with sufficient drainage infrastructure, and choices on infill material, synthetic turf carpet, and levels of mats and padding. Maintenance of synthetic turf fields requires:

- Removing surface debris (e.g., food, leaves, trash);
- Surface cleaning with solvents and cleansers;
- Grooming to keep plastic grass blades upright;
- Adding infill to maintain a level field (infill can move and break down over time);
- Repairing rips; and
- GMAX testing, which measures the shock absorption and shock impact for fields and users.

Finding #11. Maryland is in a transition climate, which makes it difficult to grow grasses. More proactive maintenance is required for natural grass fields in this climate.

There are two main categories of turfgrass: warm weather and cold weather grasses. Because Maryland is in a transition zone where temperate and subtropical climates meet, it experiences both cold and hot weather. Consequently, weather conditions in Maryland are not favorable for growing either type of grass. Bermuda grass, a warm-weather grass, is used for some athletic fields in the County as it is ideal for playing surfaces. However, in this region, Bermuda grass goes dormant in early October and stays dormant through the summer and requires intensive maintenance in the spring.

Warm and cool weather grasses both require extra maintenance to keep the surface consistent and safe for users and free from pests and diseases in the transition zone. Emerging grass technologies and research, some based out of the University of Maryland, are exploring new grass varieties that can be grown in transition zones year-round that will increase field playability and safety.

Finding #12. Synthetic turf fields can accommodate significantly more hours of use than natural grass fields.

Information from a wide variety of stakeholders, case studies, and research from organizations like FIFA (the international government body of soccer) shows that synthetic turf fields can accommodate significantly more hours of use compared to natural grass fields. Synthetic turf fields can be used year-round, even in winter if the ground is not frozen. Most natural grass fields must be closed in winter when the grass goes dormant to allow for recovery for the spring sports season.

The hours of use for natural grass and synthetic turf fields are contested. OLO could only find estimates from the Synthetic Turf Council, a trade association for the synthetic turf industry, which states a synthetic turf field can be played on for up to 3,000 hours per year. Comparatively, experts in natural grass field management informed OLO that a high-quality natural grass field (properly constructed and maintained) can be played on for up to 1,000 hours per year. FIFA also provides their best practices for hours of use by type of field, as illustrated in the table below. OLO notes these guidelines are presented for mostly professional usage and community and school usage is higher. Instead, this illustrates the maximum usage to keep a field at a pristine professional level.

Pitch (Field) Type		Description	Maximum Usage (Hours Per Week)	Life Expectancy (With Annual Renovation)
Natural Grass		100% plant-based on a soil/sand rootzone	6	1-2 years
Hybrid	Reinforced Rootzone	Synthetic material mixed with natural rootzone	8-10	Up to 5 years
	Carpet-Type	Grass is grown on a synthetic mat with synthetic fibers attached and then filled with rootzone	8-10	Up to 5 years
	Stitched Fiber	Synthetic fibers are stitched into grasses' rootzone to provide stability	Up to 20	10 to 12 years
Synthetic Turf		100% synthetic material	Up to 20 (Professional use) 40-60 (Community use)	10 years (depends on level of usage)

Rectangular Fields in Montgomery County

Finding #13. In Montgomery County, public athletic fields are owned, operated, and maintained by Montgomery County Public Schools (MCPS), the Montgomery County Parks Department (Montgomery Parks), and the Department of Recreation (Recreation). There are 784 permittable fields in the County available for public rental, including 19 synthetic turf fields.

The data in the next table show the number of permittable fields located in the County that can be permitted and rented to members of the public. The County has almost 800 athletic fields that can be permitted – including 19 synthetic turf fields (Recreation does not permit its one synthetic turf field). Community Use of Public Facilities (CUPF) is involved in permitting the use of many of the County's public athletic fields except for fields owned by Montgomery Parks.

	Stadium Fields*	MCPS HS Practice Fields**	MS/ ES Fields***	Parks Fields×	Recreation Fields	Total Fields
Total Locations	24	25	154	145	7	331##
Total Permittable Fields	**24**	**79**	**358**	**313**	**10**	**784**
# Natural Grass Fields (Not BB/SB)	13	33	192	157	5	400
# Natural Grass Fields (BB/SB)^	--	47	163	152	5	367
# Synthetic Turf Fields^^	11	0	3	4	1#	19
Responsible for Maintenance	MCPS, Contractor	MCPS, Contractor	Parks, MCPS	Parks	Recreation, DGS, Parks, Contractor	n/a
Responsible for Scheduling	MCPS, CUPF	MCPS, CUPF	CUPF	Parks	CUPF, Recreation	n/a

BB = baseball, SB = softball, HS = High School, MS = Middle School, ES = Elementary School

* Does not include the field at Montgomery Blair High School, which is owned by Parks.

**Includes stadium field at Peary High School

***Also includes fields at Emory Grove Center, Fairland Center, Grosvenor Center, Larchmont/Grace Episcopal Day School, North Lake Center, Radnor Center, Carl Sandburg Center, and Spring Mill Field Office

× Parks also operates one indoor synthetic turf field at Wheaton Sports Pavilion (not included in this study).

^ OLO identified baseball and softball fields by internal database field type designation (BBSB). Some of these fields have overlays, which means they can be permitted for activities other than baseball/softball.

^^ Two synthetic turf fields in the County (both Parks) have crumb rubber infill – the remaining fields all have organic infill. The two Parks fields (MLK and Fairland) are tentatively planned to be renovated - Fairland in Spring 2025 and MLK's renovation will begin after Fairland's completion.
A synthetic turf field at North Potomac Community Recreation Center owned by Recreation is not permitted to the public. It is not included in the total permittable fields.
The total field locations do not add up across the rows as the 24 stadium fields at MCPS are counted in the 25 HS Practice fields total for locations.

Finding #14. The maintenance of athletic fields in the County is completed by a combination of MCPS, Parks and Recreation staff, and/or by contractors for those departments.

MCPS Fields. The maintenance of MCPS athletic fields is based on the type and location of the field:

- The maintenance of high school natural grass athletic fields, both stadium and practice fields, is the responsibility of the individual schools as part of their athletic budget (and can be supplemented by booster clubs). Individual schools must contract for field maintenance from MCPS approved vendors.
- MCPS contracts out the maintenance of all its synthetic turf fields to one contractor, Keystone Sports Construction.
- Natural grass fields at middle and elementary schools are mostly maintained by Parks (212 fields at 108 locations). For those fields not under that contract, basic field maintenance either is not necessary at the location or is completed by MCPS Facilities staff.

Parks Fields. Parks completes almost all its field maintenance in-house, organizing locations into two divisions, the Northern and Southern Divisions. Park maintenance leaders in each division are responsible for their assigned geographic area and the number of parks in each area varies. Maintenance for Parks' four synthetic turf fields is also primarily completed in-house but Parks will contract out for several synthetic turf maintenance needs, including GMAX testing, redressing, or if the issue is beyond in-house expertise.

Recreation Fields. Two of Recreation's nine permittable fields (Germantown CRC and White Oak CRC) are maintained by Parks Department. The remaining locations are maintained by Recreation and the Department of General Services (DGS). The maintenance at these fields is limited to mowing - DGS pays for two mows a month throughout the year. Recreation will pay for additional mowing during peak season. Recreation's one synthetic turf field is maintained through a contractor.

Finding #15. The scheduling and permitting of athletic fields in the County are completed by a combination of MCPS, Parks, Recreation and CUPF staff.

Members of the public can book most permittable fields in the County through ActiveMontgomery, an online facility reservation system which is a joint effort between multiple County agencies and departments. The following summarizes how fields from each organization are permitted.

MCPS. CUPF is responsible for the rental of most MCPS fields through ActiveMontgomery. MCPS athletic directors have the right to close off any stadium or practice fields for MCPS team use. Natural grass high school stadium fields are only permitted through CUPF if the person/organization requesting the permit receives prior approval from the specific high school's administration. CUPF's booking processes allow a league that permitted a field in the prior year to reserve the same field (place/day/time) before reservations are offered to the general public.

Parks. Parks completes its own permitting for all of its local and regional fields through ActiveMontgomery. All natural grass Parks fields are closed from late November until March 15th. Parks has priority usage for certain organizations - these groups include individual MCPS schools, any organization that has an MOU with Parks, or groups that have rented the same field at the same time historically. The last of those groups, known as historical usage, automatically get their historical field allocation before reservations are opened to the general public.

Recreation. Like most MCPS fields, CUPF is responsible for the rental of Recreation fields through ActiveMontgomery. However, some rentals cannot be made through ActiveMontgomery and must be called directly into CUPF staff. Recreation has first rights to all Recreation fields to block time before reservations are made available to the general public. Recreation does not permit out its synthetic turf field at North Potomac – it is used internally for Recreation leagues, classes, clinics and camps.

Two important notes for the scheduling/permitting of fields in the County – both CUPF and Parks are currently completing studies that may impact athletic field use in the County. CUPF is undergoing a fee study that is reviewing the current fee structure (last updated in FY17) while Parks is undertaking a study that is looking at the current practice of historical use permitting.

Montgomery County Data on Field Use and Maintenance

Finding #16. Overall, there were approximately 140,000 hours of permitted hours of use on rectangular fields in the County in FY23. On Parks fields, an average of 1,890 hours were permitted on each synthetic turf field compared to 415 hours permitted per natural grass field. MCPS and Recreation fields showed similar patterns, with an average of 1,524 hours permitted on synthetic turf field compared to 486 hours per grass field.

There were about 70,000 total hours of rectangular Parks field rentals in FY23, with an average of 453 hours permitted per field (natural grass and synthetic turf) for all parks. For MCPS and Recreation fields, there were over 70,000 total hours of rentals in FY23 for fields at MCPS and Recreation locations, with an average of 611 hours per field for all fields (natural grass and synthetic turf). Note these data do not include use of fields for unpermitted play, such as walk-on play/cell phone leagues. Also, for MCPS fields, the data do not include all hours associated with PE and other school day activities. All synthetic fields and some grass fields have fences to limit access, however the majority of permittable fields are not fenced.

	Number Fields	Total Hours Permitted	Average Hours per Field
All Parks Fields	**155**	**70,240**	**453**
Synthetic Turf	4	7,559	1,890
Natural Grass	151	63,680	415
All MCPS and Recreation Fields	**116**	**70,930**	**611**
Synthetic Turf	14	21,341	1,524
Natural Grass	102	49,589	486

Finding #17. MCPS athletic teams sometimes must rent off campus fields for a school to have enough practice space. While not specifically tracked, data showed that MCPS high schools permitted 3,405 hours on Parks fields in FY23.

Stakeholder feedback provided to OLO emphasized there are not enough public athletic fields in the County to meet demand. Many MCPS high school athletic directors highlighted a lack of practice field availability on campus causing many schools to rent out off campus Parks fields to accommodate practices for various teams, which MCPS must pay for. This typically requires athletes to find transportation to off-campus sites for practice. While this table cannot provide a complete picture of the hours of use of high schools on Parks fields, it can provide an estimate of hours required for MCPS athletic teams.

Parks Athletic Fields, FY23 Hours of Use, by MCPS High School

High School	Hours Rented	Stadium Field	Other Permittable Fields at Location (Type of Field by CUPF Designation)
Montgomery Blair	1,852	Synthetic	2 Fields (MCPS, Practice Field) NOTE: HOME FIELD
Rockville	421	Grass	1 (Stadium Field)
Springbrook	401	Grass	None
Damascus	289	Grass	3 Fields (Field Hockey, Shotput Discus, Stadium Field)
Bethesda-Chevy Chase	132	Synthetic	1 Field (Stadium Field)
Clarksburg	106	Grass	2 Fields (Softball, Stadium Field)
Northwest	94	Grass	3 Fields (Practice Field, Practice Field, Stadium Field)
Walt Whitman	64	Synthetic	2 Fields (Baseball, Stadium Field)
Wheaton	46	Synthetic	2 Fields (Baseball, Stadium Field)

OLO also identified 1,702 hours of permitted use by MCPS high schools on MCPS/Recreation fields that are not on their home campus.

Finding #18. Installation costs are highest for a synthetic turf field; however, the installation cost for a high-end Bermuda grass field is also significantly more than a non-Bermuda grass field. Estimates provided by MCPS and Parks show that Bermuda grass fields cost the most to maintain and synthetic turf fields costing the least to maintain.

Installation. Parks provided OLO with two cost estimates for the installation of new natural grass fields – one for a lower-end field and one for a higher-end field. Costs ranged from a lower-end field at $275-$375K (includes importing topsoil, grading, sod and goals) to a higher-end field from $700-$800K (includes under drainage, irrigation, high sand engineered soil, sod and goals).[268] Estimates for synthetic turf fields provided to Parks by a synthetic turf supplier showed costs of $1.1 to $1.2 million for a new synthetic turf field and $600k-$700k for carpet replacement for an existing field.

MCPS reported they do not have current estimates for the installation of fields due to inflation and increased construction costs. However, MCPS is consulting with Soccerplex on updated cost numbers and the latest standards for grass fields. Based on preliminary information, MCPS estimates the cost for a natural grass field installation with appropriate drainage and soil will be closer to $1 million. MCPS also reported that the current cost for the replacement of a synthetic turf field is approximately $700,000, including installation of a new shock pad due to the transition from crumb rubber to organic infill. A newer cost estimate for installing and replacing a new synthetic turf field is likely to be higher now as well but is highly dependent on location.

[268] Parks notes that every field construction project is different depending on surrounding area, existing soils, field location, etc., and costs can be quite variable.

Maintenance. MCPS, Parks, and Recreation provided OLO with estimates on the differences in cost and maintenance hours of various types of fields. It is important to note that these are estimates of hours and costs – both MCPS and Parks do not have a line–item budget by field so actuals are not possible.

MCPS Athletic Field Maintenance Costs and Hours. MCPS reported to OLO they spend an estimated 250 hours per field on maintenance (including softball, baseball, and stadium natural grass fields). The table below summarizes the estimated annual costs of maintenance on high school athletic fields.

Estimated Costs of MCPS Field Maintenance

Type of Field	Includes	Estimated Annual Cost Per Field
Practice Field		
Non-Bermuda Grass	Maintenance, mowing and lining	$35,000-$40,000
Stadium Field		
Bermuda Grass	Maintenance, mowing and lining	$50,000-$55,000
Synthetic Turf	Maintenance and grooming visits, GMAX testing 2x/year	$12,000

Parks Athletic Fields Maintenance Costs and Hours. Similar to MCPS, Parks does not budget for maintenance by specific field. **Parks provided OLO with its OBI, which is a document that outlines the assumed maintenance costs and hours associated with various types of fields. The data shared is meant to be looked at as a general magnitude of labor associated with each type of field, rather than actual labor hours and costs of maintenance.** The data show that Bermuda grass athletic fields require both the most hours and highest costs for annual maintenance.

Annual Labor Hours and Costs for Parks Fields, OBI Estimates

	Total Hours Labor	Labor Costs Per Field	Non-Labor Costs Per Field	Total Costs Per Field
Non-Bermuda Grass				
Local Park	201	$6,909	$14,726	$21,635
Regional/Recreational Park	272	$10,190	$16,439	$26,629
Bermuda Grass				
Local Park	291	$9,074	$17,726	$26,800
Regional/Recreational Park	374	$18,348	$19,439	$37,787
Synthetic				
Regional/Recreational Park	335	$9,929	$23,300	$33,229

Recreation Maintenance Costs. Recreation completes minimal maintenance at five locations (Parks completes maintenance at two Recreation locations). The Department of General Services does the primary maintenance for Recreation, but Recreation completes additional mowing during peak season at an estimated cost of $1670 per month for all five sites. Recreation also has a contractor for the maintenance of their one synthetic turf field at North Potomac Recreation Center that is maxed out at $24,105 per year.

Finding #19. OLO received a significant amount of feedback from stakeholders from all sides of this debate. The following summarizes the most repeated themes heard during these meetings.

- There are not enough athletic fields in the County to meet demand. Organizations that are able to make repeated field reservations each season based on historic use believe the practices for permitting fields in the County are beneficial and necessary. Other organizations who cannot book fields find these practices detrimental. Numerous stakeholders noted there is a perception of a political nature surrounding booking athletic fields in the County.
- In a perfect world, everyone would love to play on a safe and well-maintained natural grass field. However, maintaining grass fields at a level desired by stakeholders is almost impossible with given resources and the County must limit use to help maintain natural grass fields. OLO heard from athletes and parents that want predictability of play/scheduling that comes with synthetic turf fields.
- Stakeholders did not agree on the environmental and health risks associated with synthetic turf. While data is inconclusive, for many, the "absence of data does not mean absence of harm" and stakeholders assert it is not worth the risk to expose the community to potentially dangerous chemicals from synthetic turf. For others, the physical and mental health benefits of having people outside on fields outweighed any potential risk.
- Almost all stakeholders agreed that both natural grass and synthetic turf surfaces are unsafe if they are not properly maintained.
- OLO received conflicting feedback on maintenance. Some in the natural grass industry assert that maintenance required for a good natural grass field is similar to the maintenance required on a synthetic turf field. Many other stakeholders disagreed and stated, that while there is maintenance required on a synthetic turf field, it is not comparable to the maintenance required to maintain a high-end grass field.

Discussion Items

The purpose of this report is to help the County Council and other County agencies and departments make informed choices on the surface type for athletic fields - natural grass and synthetic turf. This report is not intended to recommend one type of field over the other but to provide the known evidence and facts relating to each surface type and to summarize community feedback from a multitude of stakeholders. This section provides the Council with two discussion items to help guide the debate.

It is important to note future discussions should include larger context issues that impact the use of synthetic turf and natural grass fields:

- Demand and capacity of athletic fields;
- Local climatic and environmental factors;
- Local field conditions;
- Sport specific requirements;
- Social and equity impacts; and
- Asset management and lifecycle cost.

Discussion Issue #1. The Council should discuss with relevant stakeholders (MCPS, Parks, Recreation, community organizations) priorities regarding the use of athletic fields in the County. The decision to install, renovate, or utilize either natural grass or synthetic turf fields (or a combination of both) should be based on those determined priorities.

The choice between synthetic turf and natural grass for athletic fields impacts athletes, parents, facility managers and the community. Both options come with their own set of advantages and disadvantages. To determine whether to use natural grass or synthetic turf in a given situation, County decisionmakers should consider the following priorities:

- **Hours of Use**. Synthetic turf fields can withstand more hours of play because it does not require the same amount of recovery time a grass field. Synthetic turf can also be used year-round and in inclement weather, resulting in fewer game/practice cancellations or postponements.
- **Year-Round Play.** While there are emerging technologies in natural grass varieties that can be played on in winter (with intensive maintenance), natural grass fields typically cannot be used during winter months. Synthetic turf can be used during winter months; however, the heat of summer months can make playing on synthetic turf difficult.

- **Increasing Access.** Synthetic turf, especially in high density areas, can support more heavy use and create a space to recreate that natural grass could not do in areas with little room for greenspace.
- **Health Impacts.** There is limited evidence that the type of field athletes play on plays a significant role in injury rates. Playing on synthetic turf does increase players' risk of "turf burn" (type of abrasion resulting from playing on synthetic turf).
- **Environmental Impacts.** While research is limited, natural grass is better for the environment and helps maintain a healthier ecosystem compared to synthetic turf.
- **Playability**. Different sports are played differently on the two surfaces. Feedback indicates, for example, field hockey is safer and better played on synthetic turf. Overuse or poor weather can result in uneven and damaged playing surfaces on natural grass fields. Further, sports such as tackle football, boy's lacrosse, and girl's flag football can cause significantly more wear and tear on natural grass surfaces compared to other sports.
- **Maintenance Levels**. Both types of fields require maintenance. In general, synthetic turf fields require less maintenance compared to high-end natural grass fields.
- **Cost.** The initial cost of installing synthetic turf is more expensive than a natural grass field, with costs varying depending on numerous factors. Maintenance costs also vary, however synthetic turf fields tend to cost less to maintain compared to high-end natural grass fields.
- **Equity.** There are competing equity considerations on both sides. Some argue that use of synthetic turf allows for more equal access to athletic fields, provides players a consistent surface during play, and results in fewer cancellations and closure of fields due to weather. Others argue it is less equitable to build synthetic turf fields in less affluent areas, potentially subjecting the community to environmental hazards.

Priorities may differ in decision-making around one athletic field compared to another. The Council and stakeholders should consider environmental, social, health, and financial outcomes as a first step when balancing the use of synthetic turf and natural grass athletic fields in the County.

The County could look at past and ongoing studies, such as the one being conducted by Parks, to determine the hours of use a high quality natural grass field in the County could reach and compare it to synthetic turf fields in the County. The Council could focus on natural grass fields with proper drainage infrastructure, recommended grass for the climate, and maintained according to best practices, in order to get an accurate count of hours of use and the costs of maintenance for the field.

Discussion Item #2. The Council should discuss with stakeholders opportunities to mitigate environmental and health impacts associated with synthetic turf and natural grass fields.

Use of both synthetic and natural grass athletic fields come with potential environment impacts. The materials used in synthetic turf fields and its contribution to waste have environmental consequences. The maintenance required to care for natural grass athletic fields is generally more carbon intensive than maintenance of synthetic turf.

There are many opportunities to mitigate environmental and health impacts of fields, including:

- Installing drainage and other stormwater infrastructure to decrease runoff and filter sediments from reaching groundwater and storm drain networks;
- Siting fields away from special protection areas or waterways to alleviate sediment pollution and runoff concerns; and
- Practicing sustainable landscaping in the surrounding area of fields.

Specifically related to natural grass fields, drainage infrastructure and proper maintenance is especially important for mitigating environmental impacts. Maintenance practices can increase or decrease the amount of pollutant runoff of natural grass fields. For example, practices such as aeration and vertical mowing can decrease compaction of soils, increasing stormwater infiltration and decreasing the amount of pollutant runoff from fields.

Specifically related to synthetic turf fields, use of plant-derived infill material can eliminate one inorganic component of synthetic turf. Maintenance practices and field user education can prevent infill from leaving the field and potentially ending up in nearby soils and waterways. Opportunities exist to re-use old synthetic turf fields including:

- Processing old synthetic turf fields into shock pads that can be used for new fields; and
- Using parts of the synthetic field for surfacing in batting cages, small sports practice areas, and landscaping.

The Council should have conversations with stakeholders who build and maintain the County's athletic fields to understand what steps are routinely taken to mitigate environmental risks and to determine whether additional opportunities exist to further reduce environmental impacts.

Chapter 10. Agency Comments

The Office of Legislative Oversight circulated a draft of this report to the Chief Administrative Officer for Montgomery County, the Director of Montgomery Parks, and Associate Superintendents at Montgomery County Public Schools. OLO greatly appreciates the time taken by the County representatives to review the draft report and provide comments.

OLO's final report incorporates technical corrections provided by all three agencies. The written comments received from the CAO and Parks are included in their entirety, beginning on the following page.

OFFICE OF THE COUNTY EXECUTIVE

Marc Elrich
County Executive

Richard S. Madaleno
Chief Administrative Officer

MEMORANDUM

July 17, 2024

TO: Chris Cihlar, Director
Office of Legislative Oversight

FROM: Richard S. Madaleno, Chief Administrative Officer

SUBJECT: Draft OLO Report 2024-12: *A Comparison of Synthetic Turf and Natural Grass Athletic Fields in Montgomery County*

Thank you for the opportunity to comment on the Office of Legislative Oversight's (OLO) Draft Report 2024-12: *A Comparison of Synthetic Turf and Natural Grass Athletic Fields in Montgomery County*.

The report provides an analysis of environmental and health impacts, cost and maintenance, and usability. While the report notes some benefits, the negative impacts to the environment and health of users from the use of synthetic turf raise serious concerns including:

- Excessively high temperatures that can harm users[i] and exacerbate urban heat island;
- Synthetic turf contains toxic chemicals that may have health impacts (see report from Mount Sinai Children's Environmental Health Center[ii]);
- Synthetic fields negatively impact water quality impacts as they are effectively impervious surfaces, leading to excess runoff volume, additional pollution, and increased temperature in local waterways; and
- Microplastics that migrate away from artificial turf fields, and the fields become landfilled waste at end of life.

Additionally, the report highlights hybrid "grass" turf with both natural grass and synthetic fibers as a promising new technology and lists the benefits of this type of field while only noting that it may have high installation costs. However, hybrid fields may result in burdensome attributes of both natural and synthetic fields – requiring watering and mowing, while still containing plastics and producing heat issues (though not as bad as full synthetic turf). As hybrid fields are new,

expensive, and have similar environmental and health concerns as synthetic fields, we do not recommend their use at this time.

Due to these negative impacts, we recommend that the County prioritize the use of natural grass fields, and investments should be made to ensure that natural fields are constructed and maintained using best practices.

The draft report concludes with recommendations for two follow up discussion issues. These issues and the CAO responses are included below:

Discussion Issue #1: **The Council should discuss with relevant stakeholders (MCPS, Parks, Recreation, community organizations) priorities regarding the use of athletic fields in the County. The decision to install, renovate, or utilize either natural grass or synthetic turf fields (or a combination of both) should be based on those determined priorities.**

CAO Response: We recommend that discussions with stakeholders should focus on methods and resource needs to maximize the usability of natural grass athletic fields. Decision points include design, maintenance, and permitted use. As noted in the report, best practices should be explored throughout the region and include the maintenance and environmental practices employed at the Maryland Soccerplex on their natural grass fields.

Some of the concerns raised about natural grass fields are related to lack of appropriate design and maintenance – better designed fields with appropriate drainage and regular aeration to address compaction would help enormously, (response to pg. 81 comments). We note the section in the report that says "Many people in the natural grass industry say grass fields can withstand more use than typically assumed, especially with proper maintenance. Many stakeholders mentioned aeration as an extremely important maintenance practice that should not be skipped and could increase hours of use," (pg. 83).

If a study were done to compare natural grass fields to synthetic turf fields, such a study would need to be carefully designed with sufficient input. However, as outlined above, a better use of time and resources is to make sure that natural grass fields are well designed and maintained.

Should such a study be undertaken, the Executive branch is willing to assist in this important effort, including helping identify parameters of the study. Previous attempts at comparisons were criticized for lacking sufficient public input.

Discussion Issue #2: **The Council should discuss with stakeholders opportunities to mitigate environmental and health impacts associated with synthetic turf and natural grass fields.**

CAO Response: We agree with this recommendation. However, discussions on mitigating the impacts from synthetic turf fields should focus on existing fields and discourage the installation of new synthetic turf fields.

We appreciate the effort that went into preparing this report. The detailed information on the benefits and drawbacks of synthetic turf and natural grass fields will help the County make informed policy decisions. We look forward to discussing these items at the Council work session.

RSM/js/ds

cc: Fariba Kassiri, Deputy Chief Administrative Officer, Office of the County Executive
Ken Hartman-Espada, Assistant Chief Administrative Officer, Office of the County Executive
Tricia Swanson, Director of Strategic Partnerships, Office of the County Executive
Debbie Spielberg, Special Assistant, Office of the County Executive
Jon Monger, Director, Department of Environmental Protection
James Bridgers, Director, Department of Health and Human Services
Robin Riley, Director, Department of Recreation
Ramona Bell-Pearson, Director, Community Use of Public Facilities
Jeffrey Seltzer, Deputy Director, Department of Environmental Protection
William Broglie, Internal Audit Manager, Office of the County Executive
Christopher Rogers, Acting Chief of Public Health services, Department of Health and Human Services
Amy Stevens, Acting Division Chief of the Water Restoration Division, Acting Division Chief of the Water Restoration Division
Darian Copiz, Program Specialist II, Department of Environmental Protection
Kenneth Welch, Senior Administrator, Licensure and Regulatory Services, Public Health Services, Department of Health and Human Services

[i] https://www.nrpa.org/parks-recreation-magazine/2019/may/synthetic-sports-fields-and-the-heat-island-effect/
[ii] https://mountsinaiexposomics.org/position-statement-on-the-use-of-artificial-turf-surfaces/#:~:text=High%20temperatures%20and%20risk%20of%20heat%20illness%20lead,the%20fields%20become%20hotter%20than%20surrounding%20areas.%20

MONTGOMERY PARKS

July 17, 2024

To: Chris Cihlar
Director, Office of Legislative Oversight

RE: OLO Report 2024-12: A Comparison of Synthetic Turf and Natural Grass Athletic Fields in Montgomery County

Montgomery Parks appreciates the efforts of OLO Staff in compiling this comprehensive report on the broad and nuanced subject of natural grass and synthetic turf athletic fields. The findings contained in the report reflect a thorough reporting of the varied issues associated with natural grass and synthetic turf. Montgomery Parks looks forward to participating in the recommended discussions.

As documented in the report, there are advantages and disadvantages associated with both natural grass and synthetic turf athletic fields. Montgomery Parks believes the ability to be flexible and adapt as new research emerges and technologies improve will be vital to navigating questions of field type, maintenance, and cost into the future. To provide a varied mix of athletic opportunities and to meet the growing demand for field capacity in the county, it may be beneficial to include both surface types in the overall field inventory for the county.

Context-specific information drives all athletic field operations and decisions in Montgomery Parks and includes considerations for demand, capacity, access, equity, potential health and environmental impacts, and construction and maintenance costs. Montgomery Parks continues to monitor advances in technology and apply athletic field best management practices to minimize potential health and environmental impacts and to provide high quality playing surfaces and experiences for park users.

Sincerely,

Miti Figueredo
Director of Parks

APPENDIX

INVENTORY OF ATHLETIC FIELDS IN MONTGOMERY COUNTY

There is not a comprehensive list of athletic fields in Montgomery County. OLO attempted to compile an inventory of all permittable athletic fields in Montgomery County, including rectangular, baseball/softball, and cricket fields. This list is compiled primarily from ActiveMontgomery data, which is the scheduling and permitting reservation system for County facilities, including athletic fields. OLO requested a list of all permittable fields from ActiveMontgomery and then supplemented the list with information from Montgomery County Department of Recreation, Montgomery County Public Schools, and Montgomery Parks. **OLO acknowledges that this list might not be comprehensive or up to date.**

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELD INVENTORY

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Argyle Middle School	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Ashburton Elementary School	Baseball/Softball Under 12	Tall Fescue	Bethesda
Baker John T Middle School	Baseball/Softball	Tall Fescue	Damascus
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Baseball/Softball/Field Sports	Tall Fescue	
Banneker Benjamin Middle School	Baseball/Softball	Tall Fescue	Burtonsville
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Bannockburn Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
Barnsley Lucy Elementary School	Softball Under 11	Tall Fescue	Rockville
	Softball Under 11	Tall Fescue	
Beall Elementary School	Baseball/Softball/Field Sports Under 12	Tall Fescue	Rockville
Bel Pre Elementary School	Softball/Field Sports Under 11	Tall Fescue	Silver Spring
Bells Mill Elementary School	Baseball/Softball	Tall Fescue	Potomac
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Belmont Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Olney
	Baseball/Softball/Field Sports	Tall Fescue	
Bethesda Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Bethesda-Chevy Chase High School	Baseball	Tall Fescue	Bethesda
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Synthetic	Synthetic	
Blake James H High School	Baseball/Softball	Tall Fescue	Silver Spring
	Field Sports/Track	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Grass	Tall Fescue	
	Baseball	Tall Fescue	
	Baseball/Softball	Tall Fescue	

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Briggs Chaney Middle School	Baseball/Softball/Field Sports	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Baseball/Softball/Field Sports	Tall Fescue	
Brooke Grove Elementary School	Softball Under 11	Tall Fescue	Olney
	Softball Under 11	Tall Fescue	
Brookhaven Elementary School	Baseball/Softball	Tall Fescue	Rockville
Brown Station Elementary School	Softball Under 11	Tall Fescue	Gaithersburg
	Softball Under 11	Tall Fescue	
	Field Sports Under 11	Tall Fescue	
Burtonsville Elementary School	Baseball/Softball	Tall Fescue	Burtonsville
	Field Sports	Tall Fescue	
Cabin John Middle School	Baseball/Softball	Tall Fescue	Potomac
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Candlewood Elementary School	Softball/Field Sports	Tall Fescue	Rockville
	Softball/Field Sports	Tall Fescue	
Carderock Springs Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
	Baseball/Softball	Tall Fescue	
Carson Rachel Elementary School	Softball/Field Sports	Tall Fescue	Gaithersburg
Cashell Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Rockville
	Field Sports	Tall Fescue	
Cedar Grove Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Germantown
Chevy Chase Elementary School	Field Sports/T-Ball	Tall Fescue	Chevy Chase
Churchill Winston High School	Baseball	Tall Fescue	Potomac
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Hockey	Tall Fescue	
	Stadium Field - Grass	Tall Fescue	
Clarksburg High School	Baseball	Tall Fescue	Clarksburg
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Clearspring Elementary School	Baseball/Softball	Tall Fescue	Germantown
	Baseball/Softball/Field Sports	Tall Fescue	

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Clemente Roberto Middle School	Baseball/Softball Youth	Tall Fescue	Germantown
	Baseball/Softball Youth	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Clopper Mill Elementary School	Field Sports Under 11	Tall Fescue	Germantown
	Baseball/Softball Under 11	Tall Fescue	
	Baseball/Softball Under 11	Tall Fescue	
Cloverly Elementary School	Baseball/Softball Under 13	Tall Fescue	Colesville
	Baseball/Softball Under 13	Tall Fescue	
	Field Sports Under 12	Tall Fescue	
Cold Spring Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Potomac
	Softball/Field Sports	Tall Fescue	
College Gardens Elementary School	Baseball/Softball	Tall Fescue	Rockville
	Baseball	Tall Fescue	
	Field Sports	Tall Fescue	
Cresthaven Elementary School	Softball/Field Sports Under 11	Tall Fescue	Silver Spring
Daly Capt James E Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Germantown
Damascus Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Damascus
	Baseball/Softball/Field Sports	Tall Fescue	
Damascus High School	Baseball	Tall Fescue	Damascus
	Softball	Tall Fescue	
	Field Hockey	Tall Fescue	
	Football	Tall Fescue	
	Football	Tall Fescue	
	Shot Put/Discus	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Darnestown Elementary School	Baseball/Softball Under 9	Tall Fescue	Darnestown
	Field Sports Under 10	Tall Fescue	
Diamond Elementary School	Baseball/Softball Under 11	Tall Fescue	Gaithersburg
	Field Sports Under 11	Tall Fescue	
Drew Dr Charles R Elementary School	Field Sports Under 11	Tall Fescue	Silver Spring
	Baseball/Softball Under 11	Tall Fescue	
DuFief Elementary School	Softball/Field Sports Under 11	Tall Fescue	Gaithersburg
	Softball/Field Sports Under 11	Tall Fescue	
East Silver Spring Elementary School	Softball/Field Sports Under 11	Tall Fescue	Silver Spring
Eastern Middle School	Baseball/Softball	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Einstein Albert High School	Baseball	Tall Fescue	Kensington
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Synthetic	Synthetic	
Emory Grove Center	Baseball/Softball/Field Sports	Tall Fescue	Gaithersburg
Fairland Center	Field Sports	Tall Fescue	Silver Spring
Fairland Elementary School	Baseball/Softball	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
Fallsmead Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Rockville
	Baseball/Softball	Tall Fescue	
Farquhar William H Middle School	Baseball/Softball	Tall Fescue	Olney
	Field Sports	Tall Fescue	
Fields Road Elementary School	Baseball/Softball Under 11	Tall Fescue	Gaithersburg
	Softball Under 11	Tall Fescue	
	Field Sports Under 11	Tall Fescue	
Flower Hill Elementary School	Baseball/Softball	Tall Fescue	Gaithersburg
	Field Sports	Tall Fescue	
Flower Valley Elementary School	Softball	Tall Fescue	Rockville
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Forest Knolls Elementary School	Baseball/Softball	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
Forest Oak Middle School	Baseball/Softball/Field Sports	Tall Fescue	Gaithersburg
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Fox Chapel Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Germantown
Frost Robert Middle School	Baseball/Softball/Field Sports	Tall Fescue	Rockville
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Gaithersburg High School	Field Sports	Tall Fescue	Gaithersburg
	Baseball	Tall Fescue	
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Synthetic	Synthetic	
Gaithersburg Middle School	Baseball/Softball	Tall Fescue	Gaithersburg
	Baseball/Softball	Tall Fescue	
	Baseball/Softball Youth	Tall Fescue	
	Field Sports	Tall Fescue	
	Baseball	Tall Fescue	

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Georgetown Hill Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Potomac
	Baseball/Softball	Tall Fescue	
Georgian Forest Elementary School	Softball	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
Gibbs Jr William B Elementary School	Baseball/Softball	Tall Fescue	Germantown
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Glen Haven Elementary School	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Glenallan Elementary School	Baseball/Softball/Field Sports Under 11	Tall Fescue	Silver Spring
Goshen Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Gaithersburg
	Baseball/Softball/Field Sports	Tall Fescue	
Great Seneca Creek Elementary School	Baseball/Softball	Tall Fescue	Germantown
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Greencastle Elementary School	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Grosvenor Center	Baseball/Softball/Field Sports	Tall Fescue	North Bethesda
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Hadley Farms Middle School	Baseball/Softball	Tall Fescue	Gaithersburg
	Field Sports	Tall Fescue	
Harmony Hills Elementary School	Baseball/Softball	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
Highland Elementary School	Baseball/Softball	Bermuda	Silver Spring
	Field Sports	Tall Fescue	
Highland View Elementary School	Softball Under 11	Tall Fescue	Silver Spring
Hoover Herbert Middle School	Baseball/Softball	Tall Fescue	Potomac
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Jackson Road Elementary School	Softball Under 11	Tall Fescue	Silver Spring
	Softball Under 11	Tall Fescue	
	Field Sports Under 11	Tall Fescue	
Johnson Walter High School	Baseball	Tall Fescue	Bethesda
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Synthetic	Synthetic	
Jones Lane Elementary School	Baseball/Softball	Tall Fescue	Gaithersburg
	Field Sports Under 11	Tall Fescue	

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Julius West MS	Field Sports - Synthetic	Synthetic	Rockville
Kemp Mill Elementary School	Softball Under 11	Tall Fescue	Silver Spring
	Softball Under 11	Bermuda	
Kennedy John F High School	Baseball	Tall Fescue	Silver Spring
	Field Sports with Track	Tall Fescue	
	Stadium Field - Synthetic	Synthetic	
Kensington Elementary School - HOC Offices	Field Sports	Tall Fescue	Kensington
Kensington Parkwood Elementary School	Baseball/Softball	Tall Fescue	Kensington
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Key Francis Scott Middle School	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
King Martin Luther Middle School	Baseball/Softball/Field Sports	Tall Fescue	Germantown
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Kingsview Middle School	Baseball/Softball	Tall Fescue	Germantown
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Baseball/Softball	Tall Fescue	
Knolls Stephen Elementary School	Field Sports/T-Ball	Tall Fescue	Kensington
Lake Seneca Elementary School	Baseball/Softball	Tall Fescue	Germantown
	Baseball/Softball	Tall Fescue	
	Field Sports Under 18	Tall Fescue	
Lakewood Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Rockville
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Larchmont ES-Grace Episcopal Day School	Field Sports Under 11	Tall Fescue	Kensington
	Softball	Tall Fescue	
Laytonsville Elementary School	Baseball/Softball Under 18	Tall Fescue	Gaithersburg
	Baseball/Softball Under 8	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports Under 18	Tall Fescue	
Loiederman A Mario Middle School	Field Sports	Tall Fescue	Silver Spring

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
MacDonald Knolls Elementary School	Field Sports Under 18	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
Magruder Col Zadok High School	Baseball	Tall Fescue	Rockville
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Marshall Thurgood Elementary School	Baseball/Softball	Tall Fescue	Gaithersburg
	Field Sports	Tall Fescue	
	Field Sports Under 12	Tall Fescue	
Maryvale Elementary School	Baseball/Softball	Tall Fescue	Rockville
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Matsunaga Spark Elementary School	Field Sports	Tall Fescue	Germantown
	Baseball/Softball	Tall Fescue	
McAuliffe S Christa Elementary School	Baseball/Softball	Tall Fescue	Germantown
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
McNair Ronald Elementary School	Baseball/Softball Under 11	Tall Fescue	Germantown
Meadow Hall Elementary School	Softball/Field Sports	Tall Fescue	Rockville
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Mill Creek Towne Elementary School	Baseball/Softball Under 11	Tall Fescue	Rockville
	Baseball/Softball Under 11	Tall Fescue	
	Field Sports	Tall Fescue	
Monocacy Elementary School	Baseball/Softball/Field Sports Under 11	Tall Fescue	Dickerson
Montgomery Hills Middle School	Field Sports Youth	Tall Fescue	Silver Spring
	Field Sports Youth	Tall Fescue	
Montgomery Knolls Elementary School	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Montgomery Richard High School	Baseball	Tall Fescue	Rockville
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field -Synthetic	Synthetic	
Montgomery Village Middle School	Baseball/Softball	Tall Fescue	Montgomery Village
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Montrose Elementary School	Field Sports	Tall Fescue	Rockville

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
North Bethesda Middle School	Baseball/Softball	Tall Fescue	Bethesda
	Baseball/Softball	Tall Fescue	
	Baseball/Softball/Field Sports	Tall Fescue	
	Baseball/Softball/Field Sports	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
North Chevy Chase Elementary School	Softball/T-ball	Tall Fescue	Chevy Chase
	Field Sports	Tall Fescue	
North Lake Center	Field Sports	Tall Fescue	Rockville
Northwest High School	Baseball	Tall Fescue	Germantown
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Northwood High School	Baseball	Tall Fescue	Silver Spring
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Oak View Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Silver Spring
Olney Elementary School	Softball/Field Sports Under 11	Tall Fescue	Olney
Paint Branch High School	Baseball	Tall Fescue	Burtonsville
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Synthetic	Synthetic	
Parks Rosa Middle School	Baseball/Softball	Tall Fescue	Olney
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Peary High School	Field Sports	Tall Fescue	Rockville
	Stadium Field - Grass	Bermuda	
Poole John Middle School	Baseball/Softball	Tall Fescue	Poolesville
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Poolesville Elementary School	Baseball/Softball	Tall Fescue	Poolesville
	Field Sports	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Poolesville High School	Baseball	Tall Fescue	Poolesville
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Potomac Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Potomac
	Field Sports	Tall Fescue	
Pyle Thomas W Middle School	Baseball/Softball	Tall Fescue	Bethesda
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Quince Orchard High School	Baseball	Tall Fescue	Gaithersburg
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Radnor Center	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
Randolph Middle School	Baseball Spring Only	Tall Fescue	Rockville
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports Fall Only	Tall Fescue	
Redland Middle School	Baseball/Softball/Field Sports	Tall Fescue	Rockville
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Baseball/Softball/Field Sports	Tall Fescue	
Resnik Judith A Elementary School	Baseball/Softball	Tall Fescue	Gaithersburg
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Ride Dr Sally K Elementary School	Baseball/Softball	Tall Fescue	Germantown
	Baseball/Softball Practices Only	Tall Fescue	
	Field Sports	Tall Fescue	
Ridgeview Middle School	Baseball/Softball	Tall Fescue	Gaithersburg
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Ritchie Park Elementary School	Baseball/Softball	Tall Fescue	Rockville
	Baseball/Softball/Field Sports	Tall Fescue	
Rock Creek Forest Elementary School	Field Sports	Tall Fescue	Chevy Chase

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Rock Creek Valley Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Rockville
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Rock Terrace School (Closed Facility see Tilden MS Rock Terrace for indoor use)	Baseball	Tall Fescue	Rockville
	Field Sports	Tall Fescue	
Rock View Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Kensington
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Rockville High School	Baseball	Tall Fescue	Rockville
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Rockwell Lois P Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Damascus
Rocky Hill Middle School	Baseball/Softball/Field Sports	Tall Fescue	Clarksburg
	Baseball/Softball Under 15	Tall Fescue	
	Baseball/Softball/Field Sports Under 13	Tall Fescue	
Rolling Terrace Elementary School	Softball/Field Sports	Tall Fescue	Takoma Park
Rosemary Hills Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Silver Spring
Rosemont Elementary School	Baseball/Softball	Tall Fescue	Gaithersburg
	Baseball/Softball	Tall Fescue	
Rustin Bayard Elementary School	Field Sports	Tall Fescue	Rockville
Sandburg Carl Center	Field Sports	Tall Fescue	Rockville
	Field Sports	Tall Fescue	
Seneca Valley High School	Baseball	Tall Fescue	Germantown
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Synthetic	Synthetic	
Sequoyah Elementary School	Baseball/Softball	Tall Fescue	Derwood
	Baseball/Softball	Tall Fescue	
Seven Locks Elementary School	Baseball/Softball	Tall Fescue	Bethesda
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Shady Grove Middle School	Baseball/Softball	Tall Fescue	Gaithersburg
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Sherwood Elementary School	Field Sports/T-ball	Tall Fescue	Sandy Spring

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Sherwood High School	Baseball	Tall Fescue	Sandy Spring
	Softball	Tall Fescue	
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Hockey	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Shriver Sargent Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Silver Spring
Silver Creek Middle School	Baseball/Softball	Tall Fescue	Kensington
	Field Sports	Tall Fescue	
Singer Flora M Elementary School	Field Sports	Tall Fescue	Silver Spring
Sligo Middle School	Field Sports	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
	Baseball/Softball	Tall Fescue	
Snowden Farm Elementary School	Baseball/Softball	Tall Fescue	Clarksburg
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Somerset Elementary School	Field Sports - Synthetic	Synthetic	Chevy Chase
Spring Mill Field Office	Field Sports	Tall Fescue	Silver Spring
	Field Sports Under 11	Tall Fescue	
Springbrook High School	Baseball	Tall Fescue	Silver Spring
	Softball	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Stedwick Elementary School	Baseball/Softball/Field Sports Under 11	Tall Fescue	Montgomery Village
Stone Mill Elementary School	Baseball/Softball/Field Sports	Tall Fescue	North Potomac
	Baseball/Softball/Field Sports	Tall Fescue	
Strathmore Elementary School	Field Sports	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Strawberry Knoll Elementary School	Field Sports	Tall Fescue	Gaithersburg
Summit Hall Elementary School	Baseball/Softball Practices Only	Tall Fescue	Gaithersburg
	Field Sports Under 11	Tall Fescue	
Travilah Elementary School	Baseball/Softball/Field Sports	Tall Fescue	North Potomac
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Twinbrook Elementary School	Softball/Field Sports	Tall Fescue	Rockville
Viers Mill Elementary School	Softball/Field Sports Under 11	Tall Fescue	Silver Spring

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Washington Grove Elementary School	Baseball/Softball/Field Sports Under 11	Tall Fescue	Gaithersburg
Waters Landing Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Germantown
Watkins Mill High School	Baseball/Softball	Tall Fescue	Gaithersburg
	Baseball/Softball	Tall Fescue	
	Stadium Field - Grass	Bermuda	
Wayside Elementary School	Baseball/Softball/Field Sports Under 11	Tall Fescue	Potomac
Weller Road Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Silver Spring
	Baseball/Softball/Field Sports	Tall Fescue	
Wells Hallie Middle School	Baseball	Tall Fescue	Clarksburg
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Westbrook Elementary School	Baseball/Softball Youth	Tall Fescue	Bethesda
	Field Sports Youth	Tall Fescue	
Westland Middle School	Baseball	Tall Fescue	Bethesda
	Baseball/Softball Youth	Tall Fescue	
	Field Sports	Tall Fescue	
Westover Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
Wheaton High School	Field Sports	Tall Fescue	Wheaton
	Stadium Field - Synthetic	Synthetic	
Wheaton Woods Elementary School	Baseball/Softball	Tall Fescue	Wheaton
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Whetstone Elementary School	Baseball/Softball Under 11	Tall Fescue	Gaithersburg
White Oak Middle School	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Whitman Walt HS	Baseball	Tall Fescue	Bethesda
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Synthetic	Synthetic	
Wims Wilson Elementary School	Baseball/Softball	Tall Fescue	Clarksburg
	Field Sports	Tall Fescue	

MONTGOMERY COUNTY PUBLIC SCHOOLS ATHLETIC FIELDS

Location	Fields	Surface	City
Woodfield Elementary School	Baseball/Softball	Tall Fescue	Gaithersburg
	Field Sports	Tall Fescue	
Wootton Thomas S High School	Baseball	Tall Fescue	Rockville
	Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Stadium Field - Synthetic	Synthetic	
Wyngate Elementary School	Baseball/Softball/Field Sports	Tall Fescue	Bethesda

MONTGOMERY COUNTY DEPARTMENT OF RECREATION ATHLETIC FIELDS INVENTORY

MONTGOMERY COUNTY DEPARTMENT OF RECREATION ATHLETIC FIELDS

Location	Field	Surface	City
Damascus Community Recreation Center Field	Baseball/Soccer	Tall Fescue	Damascus
	Baseball/Softball/Soccer	Tall Fescue	
Germantown Community Recreation Center Field	Baseball/Softball	Tall Fescue	Germantown
	Baseball/Softball	Tall Fescue	
	Soccer	Tall Fescue	
Mid-County Community Recreation Center Field	Soccer	Tall Fescue	Silver Spring
Potomac Community Recreation Center Field	Soccer	Synthetic	Potomac
	Soccer	Tall Fescue	
Ross Boddy Community Recreation Center Field	Baseball/Softball/Soccer	Tall Fescue	Sandy Spring
White Oak Community Recreation Center Field	Baseball/Soccer	Bermuda	Silver Spring

MONTGOMERY PARKS ATHLETIC FIELDS INVENTORY

MONTGOMERY PARKS ATHLETIC FIELDS

Location	Field	Surface	City
Aberdeen Local Park	Field Sports	Tall Fescue	North Potomac
Arcola Local Park	Baseball/Softball/Field Sports	Tall Fescue	Wheaton
Argyle Local Park	Baseball/Softball/Field Sports	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
Arora Hills Local Park	Baseball	Tall Fescue	Clarksburg
	Baseball/Softball	Tall Fescue	
Aspen Hill Local Park	Baseball/Softball/Field Sports	Tall Fescue	Aspen Hill
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Avenel Local Park	Baseball/Softball	Tall Fescue	Potomac
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Ayrlawn Local Park	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Bauer Drive Local Park	Field Sports	Tall Fescue	Aspen Hill
Beverly Farms Local Park	Baseball/Softball	Tall Fescue	Potomac
	Field Sports	Tall Fescue	
Big Pines Local Park	Field Sports	Tall Fescue	Gaithersburg
Blair Montgomery High School/Blair Local Park	Stadium Field - Synthetic	Synthetic	Silver Spring
	Field Sports	Bermuda	
	Baseball/Softball	Tall Fescue	
Blueberry Hill Local Park	Baseball/Softball	Tall Fescue	Derwood
	Field Sports	Tall Fescue	
Bowie Mill Local Park	Field Sports	Tall Fescue	Derwood
	Field Sports	Tall Fescue	
Bradley Local Park	Field Sports	Tall Fescue	Bethesda
Broadacres Local Park	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Buck Branch Neighborhood Park	Field Sports	Bermuda	Potomac
Bullis Local Park	Field Sports	Tall Fescue	Silver Spring

MONTGOMERY PARKS ATHLETIC FIELDS

Location	Field	Surface	City
Burning Tree Local Park	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Burtonsville Local Park	Baseball/Softball	Tall Fescue	Burtonsville
	Cricket	Tall Fescue	
Cabin John Local Park	Softball/Field Sports	Tall Fescue	Cabin John
	Field Sports	Tall Fescue	
Cabin John Regional Park	Baseball - Lights	Bermuda	Bethesda
	Baseball - Lights	Bermuda	
	Baseball/Softball - Lights	Tall Fescue	
	Baseball/Softball - Lights	Tall Fescue	
	Baseball/Softball	Bermuda	
	Baseball/Softball	Bermuda	
	Field Sports	Bermuda	
Calverton Galway Local Park	Baseball	Tall Fescue	Silver Spring
	Cricket	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Cricket	Tall Fescue	
Cannon Road Local Park	Baseball/Softball	Tall Fescue	Colesville
	Baseball/Softball	Tall Fescue	
Capitol View-Homewood Local Park	Baseball/Softball	Tall Fescue	Kensington
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Cedar Creek Local Park	Baseball/Softball	Tall Fescue	Germantown
	Field Sports	Tall Fescue	
Centerway Local Park	Baseball/Softball	Tall Fescue	Gaithersburg
	Field Sports	Tall Fescue	
Cherrywood Local Park	Field Sports	Tall Fescue	Olney
Chevy Chase Local Park	Field Sports	Tall Fescue	Chevy Chase
Clarkmont Local Park	Field Sports	Tall Fescue	Boyds
Clarksburg Village North Local Park	Field Sports	Tall Fescue	Clarksburg
Clearspring Local Park	Baseball/Softball	Tall Fescue	Germantown
	Field Sports	Tall Fescue	

MONTGOMERY PARKS ATHLETIC FIELDS

Location	Field	Surface	City
Cloverly Local Park	Baseball/Softball	Tall Fescue	Colesville
	Baseball/Softball	Tall Fescue	
Colesville Local Park	Baseball/Softball/Field Sports	Tall Fescue	Colesville
	Field Sports	Tall Fescue	
Columbia Local Park	Baseball/Softball	Tall Fescue	Burtonsville
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
Concord Local Park	Field Sports Youth	Tall Fescue	Bethesda
Cross Creek Club Local Park	Field Sports	Tall Fescue	Silver Spring
Damascus Recreational Park	Baseball	Tall Fescue	Damascus
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports Youth	Tall Fescue	
	Field Sports Youth	Tall Fescue	
	Field Sports Youth	Tall Fescue	
Darnestown Local Park	Baseball/Softball	Tall Fescue	Darnestown
	Field Sports	Tall Fescue	
Dewey Local Park	Field Sports	Tall Fescue	Silver Spring
Dufief Local Park	Field Sports	Tall Fescue	Darnestown
	Field Sports	Tall Fescue	
East Norbeck Local Park	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Ednor Local Park	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
English Manor Neighborhood Park	Field Sports	Tall Fescue	Aspen Hill
Fairland Recreational Park	Baseball/Softball	Tall Fescue	Burtonsville
	Baseball/Softball - Lights	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports - Synthetic	Synthetic	
Falls Road Local Park	Baseball/Softball	Tall Fescue	Potomac
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	

MONTGOMERY PARKS ATHLETIC FIELDS

Location	Field	Surface	City
Farmland Drive Local Park	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Fernwood Local Park	Field Sports	Tall Fescue	Bethesda
Fleming Local Park	Baseball/Softball	Tall Fescue	Bethesda
Flower Hill Local Park	Baseball/Softball	Tall Fescue	Gaithersburg
Flower Valley Neighborhood Park	Field Sports	Tall Fescue	Rockville
Fountain Hills Local Park	Baseball/Softball Youth	Tall Fescue	Germantown
	Field Sports	Tall Fescue	
Fox Chapel Neighborhood Park	Field Sports	Tall Fescue	Germantown
Garrett Park Estates Local Park	Baseball/Softball	Tall Fescue	Garrett Park
	Field Sports	Tall Fescue	
Glen Hills Local Park	Baseball/Softball/Field Sports	Tall Fescue	Potomac
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Glenfield Local Park	Field Sports	Tall Fescue	Wheaton
Glenmont Local Park	Baseball/Softball	Tall Fescue	Wheaton
Good Hope Local Park	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Greenbriar Local Park	Field Sports	Tall Fescue	Potomac
Greenwood Local Park	Baseball/Softball	Tall Fescue	Olney
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Gunners Branch Local Park	Cricket	Tall Fescue	Gaithersburg
Gunners Lake Local Park	Field Sports	Tall Fescue	Germantown
	Field Sports	Tall Fescue	
Heritage Farm Neighborhood Park	Field Sports	Tall Fescue	Potomac
Hillandale Local Park	Baseball/Softball	Bermuda	Silver Spring
	Field Sports	Bermuda	
Hoyles Mill Village Local Park	Baseball/Softball	Tall Fescue	Boyds
Hunters Woods Local Park	Field Sports	Tall Fescue	Gaithersburg
Indian Spring Terrace Local Park	Field Sports	Tall Fescue	Silver Spring
Jesup - Blair Local Park	Field Sports	Tall Fescue	Silver Spring
Johnsons Local Park	Baseball/Softball	Tall Fescue	Gaithersburg
Ken Gar Palisades Local Park	Field Sports	Bermuda	Kensington

MONTGOMERY PARKS ATHLETIC FIELDS

Location	Field	Surface	City
Kensington Cabin Local Park	Baseball/Softball	Tall Fescue	Kensington
Kings Crossing Local Park	Baseball/Softball	Tall Fescue	Boyds
Kings Local Park	Baseball/Softball	Tall Fescue	Clarksburg
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Layhill Local Park	Field Sports	Tall Fescue	Wheaton
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Layhill Village Local Park	Baseball/Softball	Tall Fescue	Wheaton
	Field Sports	Tall Fescue	
Laytonia Recreational Park	Baseball - Lights	Bluegrass	Gaithersburg
	Field Sports - Lights	Bermuda	
	Field Sports - Synthetic	Synthetic	
	Field Sports - Lights	Bermuda	
Laytonsville Local Park	Baseball/Softball	Tall Fescue	Laytonsville
	Field Sports Youth	Tall Fescue	
Leaman Local Park	Field Sports	Tall Fescue	Germantown
	Field Sports	Tall Fescue	
Little Falls SVU 2	Field Sports	Tall Fescue	Bethesda
Long Branch - Wayne Local Park	Field Sports	Tall Fescue	Silver Spring
Longwood Local Park	Baseball/Softball	Tall Fescue	Olney
Luxmanor Local Park	Baseball/Softball/Field Sports	Tall Fescue	Potomac
	Field Sports	Tall Fescue	
Lynnbrook Local Park	Baseball/Softball	Tall Fescue	Bethesda
	Field Sports	Tall Fescue	
Manor Oaks Local Park	Baseball/Softball	Tall Fescue	Olney
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Maplewood-Alta Vista Local Park	Baseball/Softball	Tall Fescue	Bethesda
	Field Sports	Tall Fescue	
Martin Luther King Recreational Park	Baseball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports - Synthetic	Synthetic	
	Field Sports	Bermuda	

MONTGOMERY PARKS ATHLETIC FIELDS

Location	Field	Surface	City
Meadowbrook Local Park	Baseball/Softball	Tall Fescue	Chevy Chase
	Field Sports	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Meadowood Local Park	Baseball/Softball/Field Sports	Tall Fescue	Colesville
	Field Sports	Tall Fescue	
Merrimac Neighborhood Park	Field Sports Youth	Tall Fescue	Bethesda
Mill Creek Towne Local Park	Football	Tall Fescue	Gaithersburg
Milton Kaufmann Local Park	Baseball/Softball	Tall Fescue	Montgomery Village
	Field Sports	Tall Fescue	
Mount Zion Local Park	Baseball/Softball	Tall Fescue	Brookeville
Moyer Road Local Park	Field Sports	Tall Fescue	Damascus
Newport Mill Local Park	Baseball	Tall Fescue	Wheaton
	Baseball/Softball	Tall Fescue	
Nike Missile Local Park	Baseball/Softball	Tall Fescue	Gaithersburg
	Field Sports	Tall Fescue	
Nolte Local Park	Baseball/Softball/Field Sports	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
	Baseball/Softball	Tall Fescue	
North Chevy Chase Local Park	Baseball/Softball/Field Sports	Tall Fescue	Chevy Chase
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
North Four Corners Local Park	Field Sports	Bermuda	Silver Spring
Northwest Branch Recreational Park	Field Sports	Tall Fescue	Aspen Hill
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	

MONTGOMERY PARKS ATHLETIC FIELDS

Location	Field	Surface	City
Norwood Local Park	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Olney Manor Recreational Park	Baseball - Lights	Tall Fescue	Olney
	Baseball - Lights	Tall Fescue	
	Baseball/Softball - Lights	Tall Fescue	
	Baseball/Softball - Lights	Tall Fescue	
	Baseball/Softball - Lights	Tall Fescue	
Ovid Hazen Wells Recreational Park	Baseball/Softball	Tall Fescue	Clarksburg
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Owens Local Park	Baseball/Softball	Tall Fescue	Beallsville
Parkland Local Park	Baseball/Softball/Field Sports	Tall Fescue	Aspen Hill
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Parklawn Local Park	Field Sports	Tall Fescue	Wheaton
	Field Sports	Tall Fescue	
Pinecrest Local Park	Field Sports	Bermuda	Silver Spring
Pleasant View Local Park	Field Sports	Tall Fescue	Wheaton
Quince Orchard Knolls Local Park	Baseball/Softball	Tall Fescue	Darnestown
	Field Sports	Tall Fescue	
Randolph Hills Local Park	Baseball/Softball	Tall Fescue	Silver Spring
	Baseball/Softball	Tall Fescue	
	Field Sports	Tall Fescue	
Rays Meadow Local Park	Field Sports	Tall Fescue	Chevy Chase
	Field Sports	Tall Fescue	
Redland Local Park	Socccer	Bermuda	Gaithersburg
Ridge Road Recreational Park	Baseball - Lights	Tall Fescue	Germantown
	Baseball/Softball - Lights	Tall Fescue	
	Baseball/Softball - Lights	Tall Fescue	
	Field Sports - Lights	Bermuda	
	Field Sports	Bermuda	

MONTGOMERY PARKS ATHLETIC FIELDS

Location	Field	Surface	City
Rosemary Hills-Lyttonsville Local Park	Baseball/Softball	Tall Fescue	Silver Spring
	Field Sports	Tall Fescue	
Saddlebrook Local Park	Field Sports	Tall Fescue	Silver Spring
Sangamore Local Park	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
	Field Sports	Tall Fescue	
Seven Locks Local Park	Field Sports	Tall Fescue	Cabin John
Sligo - Dennis Avenue Local Park	Baseball/Softball/Field Sports	Tall Fescue	Silver Spring
South Germantown Recreational Park	Cricket	Tall Fescue	Germantown
	Field Sports Games Only	Bermuda	
	Field Sports Games Only	Bermuda	
	Baseball Youth	Tall Fescue	
	Baseball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball	Tall Fescue	
	Miracle Field	Synthetic	
South Gunners Branch Local Park	Field Sports	Tall Fescue	Germantown
Southeast Olney Local Park	Field Sports	Tall Fescue	Olney
	Field Sports	Tall Fescue	
Spencerville Local Park	Cricket	Tall Fescue	Silver Spring
	Cricket	Tall Fescue	
Stewartown Local Park	Field Sports	Tall Fescue	Gaithersburg
Stonegate Local Park	Field Sports	Tall Fescue	Silver Spring
Stonehedge Local Park	Field Sports	Tall Fescue	White Oak
Stoneybrook Local Park	Field Sports	Tall Fescue	Wheaton
Strathmore Local Park	Field Sports	Tall Fescue	Aspen Hill
	Baseball/Softball	Tall Fescue	
Stratton Local Park	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Strawberry Knoll Local Park	Cricket	Tall Fescue	Gaithersburg
	Cricket	Tall Fescue	
Sundown Road Local Park	Baseball/Softball	Tall Fescue	Laytonsville
	Baseball/Softball	Tall Fescue	
Tilden Woods Local Park	Baseball/Softball/Field Sports	Tall Fescue	Potomac
	Field Sports	Tall Fescue	

MONTGOMERY PARKS ATHLETIC FIELDS

Location	Field	Surface	City
Timberlawn Local Park	Field Sports	Tall Fescue	Bethesda
	Field Sports	Tall Fescue	
Veirs Mill Local Park	Baseball/Softball/Field Sports	Tall Fescue	Wheaton-Glenmont
	Baseball/Softball/Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
	Field Sports Youth	Tall Fescue	
Waring Station Local Park	Field Sports	Tall Fescue	Germantown
Waters Landing Local Park	Field Sports	Tall Fescue	Germantown
West Fairland Local Park	Baseball/Softball	Tall Fescue	Colesville
	Baseball/Softball	Tall Fescue	
Westmoreland Hills Local Park	Baseball/Softball/Field Sports	Tall Fescue	Bethesda
	Field Sports	Tall Fescue	
Wheaton Forest Local Park	Baseball/Softball	Tall Fescue	Wheaton
	Baseball/Softball	Tall Fescue	
Wheaton Regional Park	Baseball - Lights	Tall Fescue	Wheaton
	Baseball/Softball - Lights	Tall Fescue	
	Baseball/Softball - Lights	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball/Softball	Tall Fescue	
	Baseball	Bermuda	
Wheaton Woods Local Park	Field Sports	Tall Fescue	Wheaton
Whittier Woods Local Park	Baseball/Softball	Tall Fescue	Bethesda
	Field Sports	Tall Fescue	
Winding Creek Local Park	Field Sports	Tall Fescue	Wheaton
	Field Sports	Tall Fescue	
Wood Local Park	Baseball/Softball	Tall Fescue	Rockville
	Field Sports	Tall Fescue	
	Field Sports	Tall Fescue	
Woodacres Local Park	Baseball/Softball/Field Sports	Tall Fescue	Bethesda